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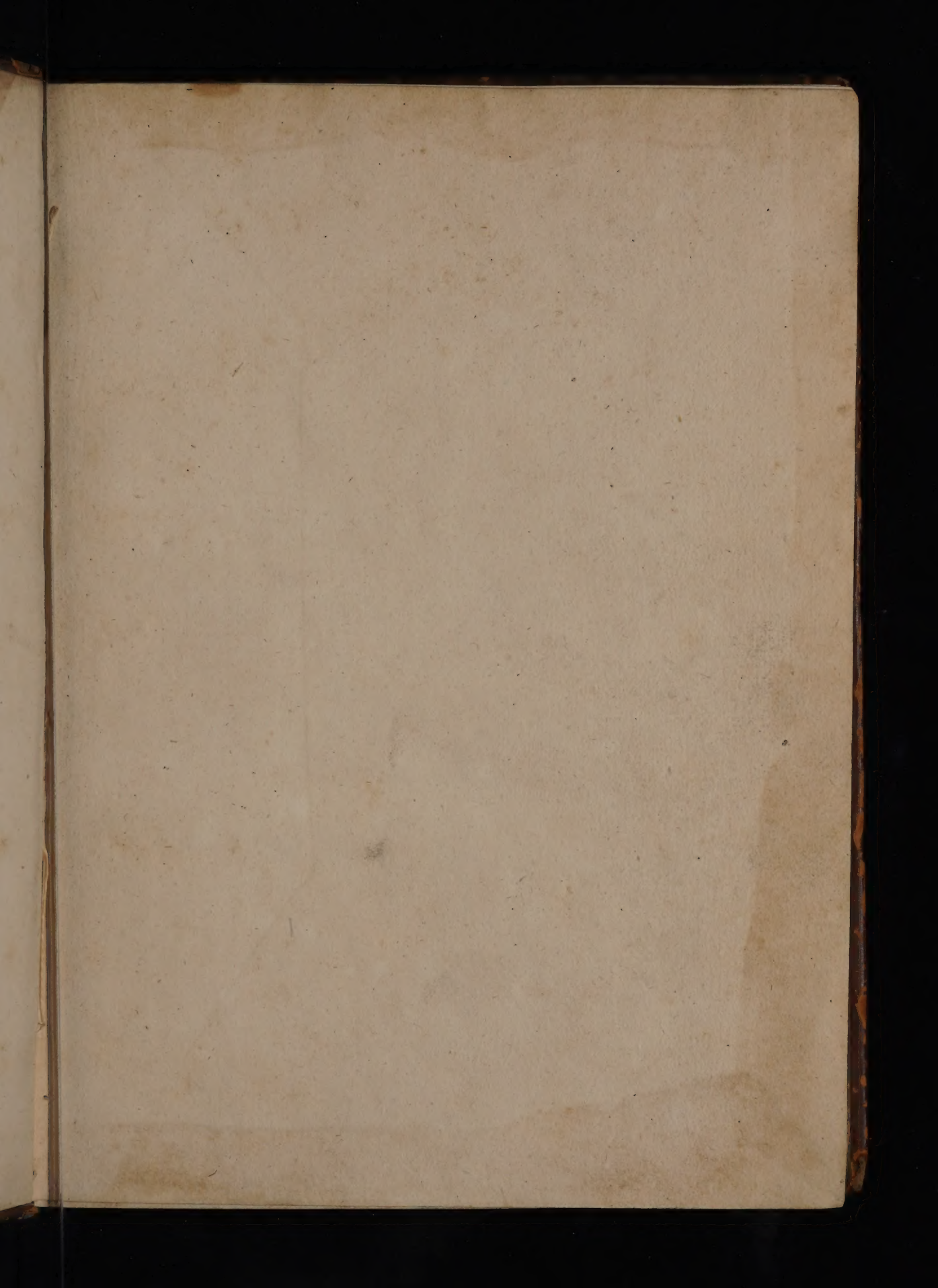
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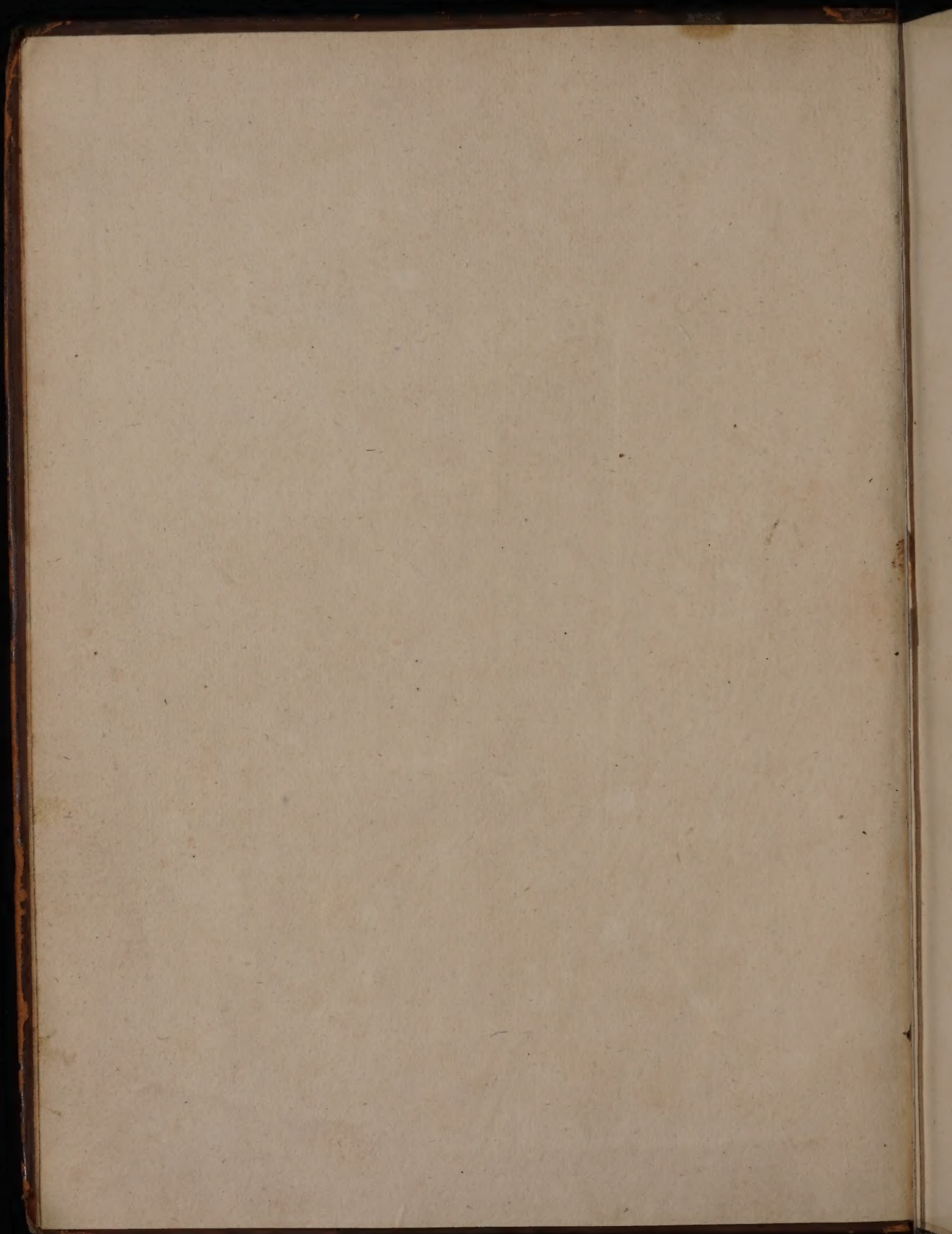
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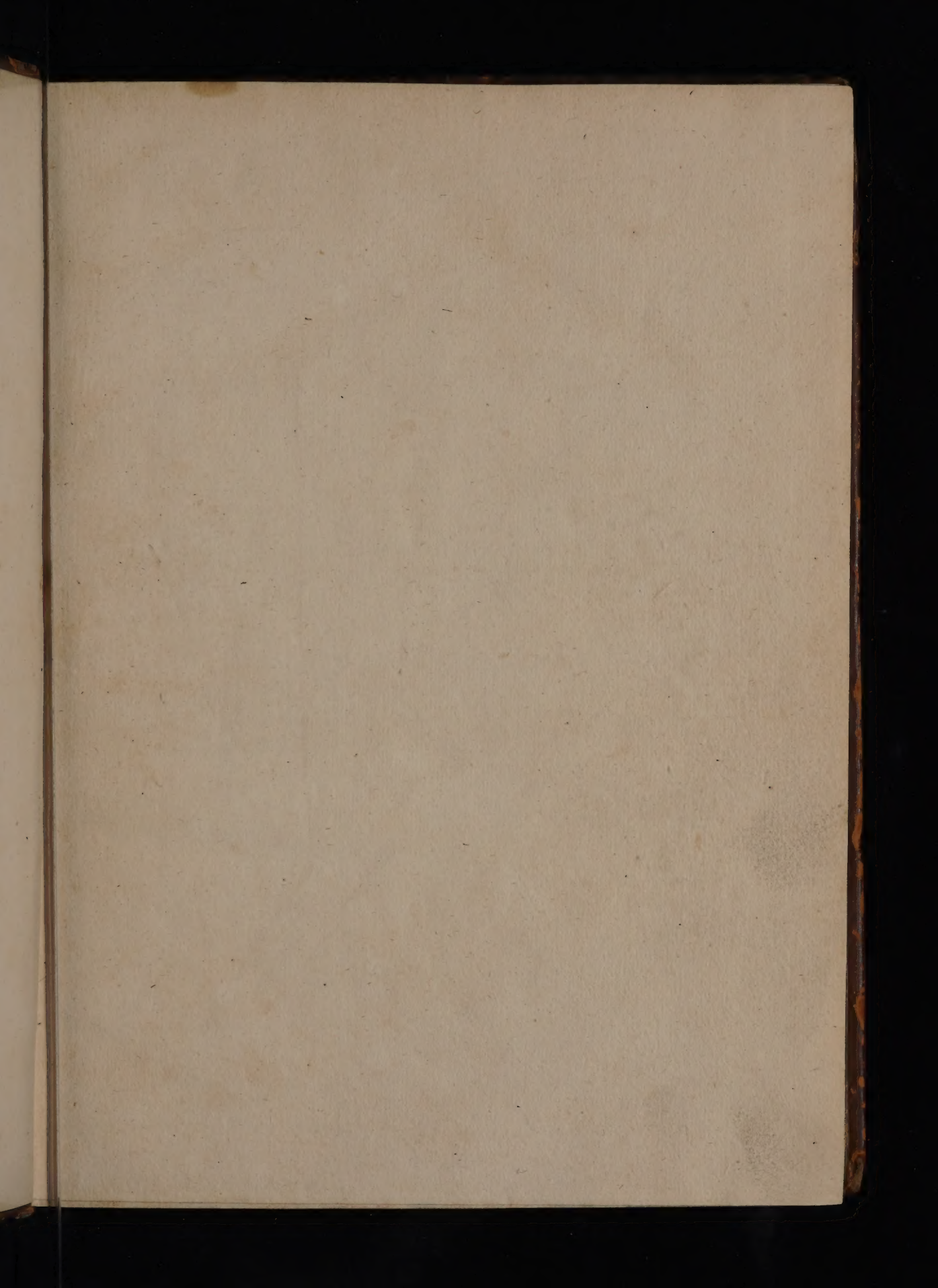
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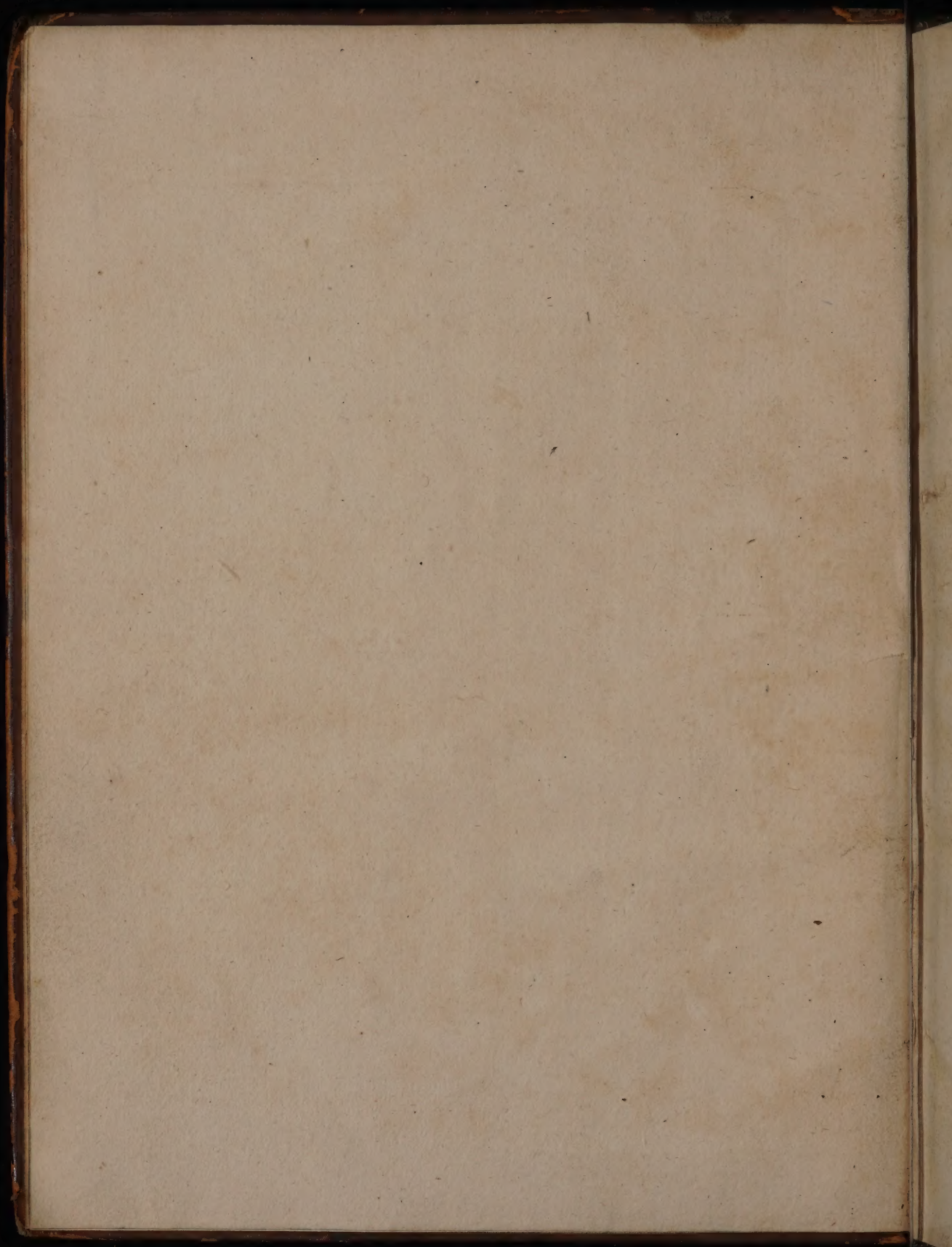














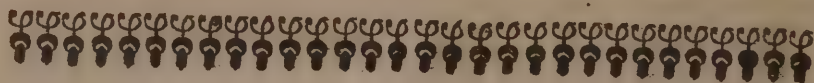
THE UNIVERSITY OF CHICAGO

1944



**T**He favorable Censure of the *Reader* is craved for what *Errors* have happ'ned in Printing, which the Authors leisure hath neither permitted him to prevent nor correct : However I am to desire that these two may be thus read, *viz.* In the 2 Pag. of the *Dedication*, line the 11, for (*your Supporters*) read (*their Supporters*) and pag. 105. lin. ult. read *Libavins.*

N. H.





1263

*Legends no Histories :*  
O R, A  
**SPECIMEN**  
Of some  
**ANIMADVERSIONS**  
Upon the *HISTORY* of the  
**Royal Society.**

Wherein, besides the several Errors against Common Literature, sundry mistakes about the making of *Salt-Petre* and *Gun-Powder* are detected, and rectified : whereunto are added two Discourses, one of *Pietro Sardi*, and another of *Nicolas Tartaglia* relating to that Subject. Translated out of *Italian*.

WITH  
A brief Account of those passages of the *Author's Life*, which the *Virtuosi* intended most to censure, and expatiate upon : Written to save them the trouble of doing any thing besides *defending themselves*.

TOGETHER  
With the **P L U S U L T R A** of  
*Mr. Joseph Glanvill* reduced to a **NON-PLUS**, &c.

BY  
*Henry Stubbe*, Physician at *Warwick*.

|| *At vos interea venite ad ignem*  
*Annales Velsi, cacata charta.*

*Catullus.*

Printed at *London*, and are to be sold by the Book-sellers  
there. 1670.





The Preface to the Judicious

# R E A D E R.

**I**T may perhaps, and that not *unjustly*, be wondered, that I should appear in behalf of the *Antient* and *Aristotelian* Philosophy, who have always been thought averse from it, and inclined to that which is more *Novel*. And it is true, that I have not such a *veneration* for the *Peripatetical* *Physicks*, as some others have, nor do I think they so *satisfactorily* explicate the *Phænomena* in *sublunary* things, as that an *inquisitive* brain can *acquiesce* therein: but this is not so much the *deficiency* of that *Learning*, as of *humane* *Nature*; the attempt it self being so little *feasible*, that *whosoever* shall design any *such thing*, shall involve himself in the like *miscarriages*, as appears from what *Gassendus*, *Des Cartes* and others have done, from whose performances the *greatest* advantages we have yet derived is, that it seems manifest how *easy a thing* it is to find *defaults*, and how *difficult* to amend *them*; and how the *Man* of *Stagira* was not *singular* in his *failors*.

If the *Cartesian* Hypothesis seem to be *demonstrated* *sufficiently* in this, that it is agreeable to the *general* *occurrences* of *Nature*, and solves the *difficulties* emergent, as if it were absolutely true: If this, I say, may pass for *sufficient* *proof*, I know not why a *Physician* may not submit unto the like *conviction*, who daily *experiments* that the *Aristotelian* Philosophy (which with some little *discrepancie* of *opinions*, and *diversity* of *explications* hath been transmitted from the *Asclepiade*, *Hippocrates*, *Anton*, *vnder* *Linden* de *circuito* *sanguinis*. *How false that Cartesian assertion is, the learned and pious Dr. More hath in sundry pieces demonstrated.*

Exercit. 9. Sect. 2. 1. Hieron. Mercurialis de hom. generat. c. 2. Andr. Laurent. anatom. l. 2. q. 17.

\*

and

and *Aristotle* to their *Alexandrine*, *Grecian*, *Sarracenic*, and *Christian* Physicians through so many ages, revolutions, and different *Climates*) is most conformable to the Subject about which his *Faculty* is employed, the explanation of *Diseases*, their *Nature*, their *Symptoms*, their *tendency*, and *Cure*.? Not only the *Chyrurgical*, but *Medicinal* part of *Physick* hath been carried on and stated upon those general grounds, and that with such assurance, that where any learned and solid practitioner of that way shall happen to be at a loss, those which are enemies to it, the admirers of the *Virtuosi* and of *Odowde*, have not been able to make any considerable advantage thereby. Most that the *Novellists* have done, is to find out new reasons for an antient practice, and to shew how the old *Medicaments* wrought to their effects in another way than was supposed: but they have neither discredited the *Medicines*, nor *Method* with any understanding men: Whatever superlative discoveries have been made of late, a short time and tryal hath convinced us of the inutility of the most famed inventions and *Theorems*; and the tedious, costly, new *Medicaments* have scarce continued to be nine days wonder. I speak not this out of contradiction I carry to these *Virtuosi*; it is the result of my thoughts after twelve years of deliberation, after observations accurately made in my own practice, and in that of other antient men: and as it is known how I never desired any thing so much as the benefit of my Patients; so I hope I may be believed when I protest that my *Ambition* and *Interest* both suggested unto me a desire of achieving *Miracles* in *Physick*, if it had been possible. But, since whatever *repute* I have required I owe it to that *Physick* which hath descended down unto this age by the means of such as have been of the *Aristotelian* and *Galenical* way, I am but just unto those *worthies* in thus declaring against their puny *Adversaries*, who deserve all that contempt wherewith we depreciate the illiterate and fools, when they tell us that the *Antient Method*

Mr. Glarvil in  
his plus ultra  
pag. 7.

Mr. Sprat. pag.  
117, and 327.

will not qualifie us to work, or enable us TO CURE A CUT FINGER, may less discover the nature, and course of *Diseases*, the operation of *Druggs*, and the right compounding of them for the benefit of the sick.

Although



### *The Preface to the Reader*

Although that this Reason might sufficiently justify me for what I have done, yet I had more powerful inducements which pressed me unto this design; and those are the exigences of the *English Monarchy*; whereunto since the good Providence of God hath subjected us once again, it is the prudence of every particular person to contribute all he can to the support of it, against all such intendments as may either introduce Popery on the one side, (which renders the Title of our King, and his power precarious, and will subvert the whole Commonalty of England in their Estates, not to mention the concern of our Souls, and that intellectual slavery whereto we must submit) and against all Anarchical projects, or Democratical contrivances, whercof a debauched and ungenerous Nation is not capable, and which cannot take effect without such variety of changes, as no sober man will think upon without horror, nor any that is wise pursue as feasible. I do avow therefore that the desire I had to contribute what I could to uphold the Fundamental Policy of these Kingdoms, was the principal motive I had to write this Treatise: and that how willing soever I was otherwise to discharge all intelligent persons from the insupportable prating of these Comical Wits, and to avenge my own faculty upon these insolents, yet the circumstances which I saw might create me future troubles and vexations were such, that nothing less than a generous and necessary inclination to serve my Countrey could have made me despise them. I have so small a regard for deep and subtle inquiries into Natural Philosophy, and the intricate Mechanismes by which this World is said to be governed, that could Physick be unconcerned in their debates, could Religion remain unshaken amidst the writings of these Vertuosi, could that Education be carried on happily whereby the Subjects are qualified to serve their Prince in all Negotiations and Employments, and their Countrey in Parliament, I should not entermeddle: but, if we

Whosoever would be satisfied about the imprudence, vanity, and perniciousness of all attempts to subvert the Monarchy of England now, and introduce a Democracy; I would advise him to read over the Political discourses of Malvezzi in Tacitus, disc. 3. Boccalini advert. cent. 2. advert. 30. Paolo Paruta disc. politic. 8. Chr. Forstner, in Tacit. l. 1. p. 3, 4, 5, 6. Ut verissime dixerit Cosmus Medicus Cardinali Salviato, in tanta opum inaequalitate, morumque corruptione, Florentinam Rempub. non esse amplius libertatis capacem, quam optari potius quam sperari debeat. The reasons why the last Brutus miscarried in his design, will convince any man.

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look *de facto* upon these *Experimental Philosophers*, and from too fatal tryals judge how little they are fitted for those trusts and management of business by that so famed *Mechanical Education*; and if we consider how much this Nation owes to *Burleigh*, *Walsingham*, *Jewel*, *Abbot*, *Perkins*, *Whitaker*, *Usher*, *Davenant*, *Casaubon*, &c. & that by complying with these *Novel projects* for the breeding up of *Youth*, we deprive our selves of all our hopes to see such persons either in *Church* or *State*; we must rise as high in our resentments against the *Authors of this History*, & *Mr. Glanvils Book* (where more than one or two *Virtuosi* that contributed unto it) as the concerns of the present Age and of our posterity can animate us. That *Art of reasoning* by which the prudent are discriminated from fools, which *methodizeth* and facilitates our discourses, which informs us of the validity of *Consequences*, and the probability of *Arguments*, and manifests the fallacies of *Imposers* and *Comical Wits*; that *Art* which gives life to solid *Eloquence*, and which renders *States men*, *Divines*, *Physicians* and *Lawyers* accomplished, how is this cried down and vilified by the *Ignoramus's* of these days? What contempt is there raised upon the *disputative Ethicks* of *Aristotle*, and the *Stoiques*? And those *Moral instructions* which have produced the *Alexanders* and the *Ptolomeys*, the *Pompeys* and the *Ciceroes*, are now flighted in comparison of *day-labouring*! Did we live at *Sparta*, where the dayly employments were the exercises of substantial *vertue* and *Gallantry*, and men, like *setting-dogs*, were rather bred up unto than taught reason & worth, it were a more tolerable proposal (though the different policy of these times would not admit it) but this working so recommended is but the feeding of *Carps* in the *Ayr*, the weighing of a *pike* in water, the cooling of *Wine* with *Sal Armoniac*, (published long ago by *Berigiardus*) the guilt *varnish* (no secret to some *Trades-men* in *London*) or the inventing of an *Ambling-saddle*. As for the study of *Politicks*, and all *Critical Learning* together with *Church-History*, these are either *pedantical*, or *tedious* to those who have a shorter way of studying Men? Those *Metaphysics* which the constant policy of *Chriſtendom* hath found so advantageous, that without a *Miracle* we could not have born up against the *Heathen-Philosophers*, *Arrians*, *Sarracens*, and *Soci-nians*,

Mr. Sprat, pag.  
324.

See Mr. Glan-  
vill's plus ul-  
tra pag. 123. &  
pag. 118, 119.

Mr. Sprat pag.  
341, 342.

Mr. Sprat pag.  
326.



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nians, and out of which we do so confound the *Papists*; these must be laid aside; and are we not then in a fit posture to encounter *Bellarmino*, and *Baronius*? I remit these things to the consideration of all serious patriots, and do earnestly desire that they would with attention read over *Campanella* concerning the Spanish Monarchy, Ch. 23. pag. 142. ch. 25. pag. 157. ch. 27. pag. 177, 182. and the last part of the *History of the Royal Society*, and maturely whether the projects of the one be not put in execution by the other.

I follow the English Edition of Campanella, and do recommend these places, especially the last citation, to every serious Patriot his consideration.

I doubt not but this attempt of theirs was no part of the intentions of their Royal Founder: I am sure the publique utility is more dear unto Him than the giving of some men an opportunity to entertain their Melancholy, and divert their idle hours, or to acquire the reputation of Airy wits and Drolls: if He be their patron, it is certain that He is the Father of his Country, and the Head of the Church; the obligations he hath to these are so great and so near unto him, that these little Engagements must give place thereunto: Nay, He hath herein been Exemplary to his Subjects, by withdrawing much of his Encouragements, and testifying frequently his disesteem of these Experimental Philosophers. Thus many of the Nobility, most of the Physicians, and other understanding and serious persons have either totally deserted the Society, or discontinued their presence at their Assemblies. And I could wish they would not abuse the World with false Catalogues, but give us a true one of such men as do now frequent their meetings, keep correspondence with them, and pay the usual contribution.

Having so great Presidents to justify my contempt of them, methinks I need not apprehend the censure of those Illustrious and Honorable personages who might otherwise seem concerned in this Quarrel. The same motives which prompted them to advance the Royal Society, must now excite their indignation against them: the desire of advancing of the Glory, and the trading of this Nation, &c of understanding natural curiosities engaged them in this Society; but now that these men have no way answered their expectation, since their relations and Experiments, are so trivial, defective, and false, since that the Authors of this

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*this fatal History* have more in them of *Campanella*; than of Mr. *Boyl*; since they have relinquished the *original designs*, and deviated so notoriously from the intention of the *Royal Founder*, and what those *Eminent persons* purposed, who first closed with them: I will not think them any more involved in this contest, than patrons are where their favours are abused. And I protest that I bring with me all the respect and Honor in the world for those persons of Honor, who in so dissolute an Age gave the world that testimony of their generous intentions, which was to design the improvement of useful knowledge by these men: And I am concern'd to see their Gallantry so abused, so that nothing exasperated my peace more than a resentment for their Honor: Had the Experimental Philosophers acquitted themselves in their trust better, yet ought I to have been commended for animadverting upon these Books: the notorious untruths and Errors against common Literature were such, that Foreigners, who inquire into the writings and transactions of these Comical Wits, would have concluded that we were universally degenerated into the old British ignorance, and that the Bards once more swayed in this Land: But I have taken off from the generality of this imputation; and dare presume that those that were no more than Honorary Members (and consequently not concerned in the private contests and suits of the Corporations they so stand related unto) will express a kindness for my performance.

Having thus excused my self to the persons of Honor, I shall briefly say something to those of unquestionable Learning that reside amongst the Society: I am sorry to finde them there, and that I must accommodate to their worth that Ancient saying, *Ingenium Galba male habitat*: their number, and interest seems so small there, that this History could pass with applause, notwithstanding them, and Mr. *Glanvil* be commended: with what credit can they resort unto the meetings of these Comical Wits, whose ridiculous actions reflect upon them, and upon which Assembly to bestow the *Elogies* of the Learned, or *Virtuous*, 't would be as improper in an *Aristotelian*, as to denominate an *Aethiopian* to be white because of his Teeth? He must be



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be insensible of all merit that can derogate from Sir Robert Murray, Dr. Wren, or Dr. Wallis : and to suspect that the truly Honorable and inquisitive Mr. Boyle would abet a design that should subvert piety, and the Protestant Religion, doth not become any that knows him, or his Writings. But since good men are often-times made use of to pernicious ends, and unwittingly become instruments of the basest frauds ; since none are to judge of Affairs by their tendencie, and not by the persons that openly manage them ; I doubt not but even these persons and others of integrity and solid worth will not imagine themselves concerned in the maintenance of those Errors, which they cannot approve of, and every one knows they could not commit, nor hinder.

I have been thus large in the Preface to remove all umbrages and misconstructions to which this undertaking might subject me : the Preface also against Mr. Glanvill may seem a little prolix in comparison of the subsequent Discourse ; but the Specimen being lodged at London, partly in transcribing, and partly because that the distance of the Term made the Edition less seasonable, I thought fit to enlarge that Preface much during my stay at Bathe, and to annex those other Observations made there, and what else is taken out of the Disputations of Vander Linden about the Circulation of Blood, which Book I could not procure the sight of before.

There be many defaults in the Language, and connexion of passages which may be liable to some censure : But whilst the Body of my Discourse stands firm, the advantages which the Comical Wits shall derive from those peccadilloes will not be much : especially when I shall plead that the work was written amidst the heat of my practice : that the papers were not written, nor any discourse finished at one time, but with frequent interruptions : that the several parcels and fragments were sent to sundry Learned persons to experiment their judgment ; that they were joyned together with some alterations and new connexions, without any review of mine, at London : several additions being to be inserted, as they came into my mind, in divers places, and so transmitted by the post : which occasioned  
great

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great trouble: in fine, had not some publique spirited Gentlemen there undertook to translate the *Italian* pieces, and to see the work transcribed, and the *insertions* made, and the *connexion* in some measure supplied, I could never had leasure to finish my intendments.

After this piece there shall follow the next Term (if God give me leave to perfect what is almost finished now) A *Vindication* of Aristotle from the calumnies with which Mr. Glanvill hath aspersed his person, in his Letter which is joyned to the Edition of his *Sceptis Scientifica*, which bears the *Arms* and is dedicated to the *Royal Society*; as as he repeats again and again the same things, so he is still the same illiterate person: having never so much as read over *Diogenes Laertius*.

There are also three Letters of mine which may at some time or other become publique. The first, to a person of Honor and Member of the *Royal Society*, shewing how my writing against these *Comical Wits* doth not derogate from the persons of *Quality* who are *Honorary Members* of the same Assembly: especially since they have acted so much contrary to the intentions of those illustrious Patriots that at first encouraged them; there are the passages of *Campanella* set down, and commented upon. & the third part of the *History of the Royal Society* animadverted upon, as being directly subservient to his *Propoposals* for the restoration of *Popery*, with some accessional Characters, which Mr. Sprat, and Mr. Glanvil bestow upon the useful University-Learning.

The second, to a person of Honor, no Member of the *Royal Society*, shews, that it is impossible to arrive at any exact Science in *Natural Philosophy*; that if it were possible, yet these *Comical Wits* and their Method could never achieve it: I shew here that it negligence in making observations; their fallshood in relating

Here I further them: that they either are ignorant of what is published by pursue Mr. Sprat for the mistakes against common licence, with which the History abounds

Antient and Modern Writers, or most egregious plagiaries: that the Aristotelians and Galenists were never enemies to Experiments, but cautious about concluding any thing rashly from them, or making such as were unsafe and inconsistent with a good conscience: and that the Experiments recorded by the Galenical



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*Jehical Physicians* infinitely surpass as to *Physick*, and even *Natural Philosophy*, what ever these *Comical Wits* can pretend unto. I add, that the deep study of *Natural Philosophy* is not requisite, but rather destructive to all *Politics*, (as appears by *History*) neither is that or the *Mathematicks* necessary to the improvement of *Manual Trades* and *Arts*, since those *Countries* where *Philosophy* and *Mathematicks* have been generally ignored, (as in *Asia*, and during the times of the *Romans* luxury) *Mechanical Artisans*, and such *Manufactures* have most flourished: that the *Luxury* which is now in fashion hath nothing in it that may compare with the ingenuity of the *Antient Virtuosi*: that those of old *Rome* did make an *Icarus* to fly, and in his flight to fall down and besprinkle *Nero* with his Blood; whereas our *Fopps* have been these many years studying how to flie, yet have not so much as effected the most facile part of the attempt, which is, to break their necks.

The third is to a learned *Physician*, shewing the damages our *Faculty* hath sustained by these *impertinents*: the condition of *Physick* and *Chyrurgery* as it is at present by reason that the *Divines*, *Mountebanks*, *Quacksalvers*, *Apothecaries*, and every rude *Experimentator* countenanced by the principles and repute of these *Virtuosi*, all practise it: the inconveniences to the *Monarchy* thereby are considered, and the unreasonableness of what the *Virtuosi* alledge, as also the vanity of sundry of their *Experiments* (besides what are old, and impudently obtruded on us for new) is demonstrated.

And if there be any person worthy of my indignation that will justify the *Rhetoricalness* of the *History of the Royal Society*, I will write a fourth about that, shewing that choice of words, and a smooth and numerous period is not compleat *Eloquence*; but if the Subject-matter be foolish and irrational, 'tis a sort of madness in the judgment of *Tully*: and that if all the instances of *puerile* & jejune *Eloquence* were lost, which are recorded by *Seneca* and *Quintilian*, I protest I could supply a great part of that damage out of this famed *History*: and if any fitting *Adversary* declare hereupon, I will make these *Comical Wits* as much renounce the *Antient Orators*, as they do now the *Philosophers*.

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I should here put an end to this *Introductory* discourse, but 'tis fitting the world should know how not only illiterate but mean-spirited these *Virtuosi* are: when I declared that I would animadvert upon Mr. *Sprat*, and Mr. *Glanvill*; these *Comical Wits* not only intimated to me, but in all places divulg'd that if I attempted any such thing, they would appoint some ingenious men of their number to write my *Life*, thinking hereby to terrifie me, and make me fear their *Satyres*; who despised their *Learning* and other abilities. The effect of this their project was such, that I found all persons of Honour and ingenuity to condemn it universally: pitiful *Mechanicks*, that being so ridiculous already, multiply occasions of further contempt! The course is usual amongst the *Papists*, and therefore less to be admired or strange in these *Virtuosi*. When the Bishop of *Spalato* writ his excellent Books against the *Romanists*, they answered him by calumniating his life: when *Padre Paolo* writ the *History* of the Council of *Trent*, the Jesuit *Palavicini* begins his *Anti-History*, with a long debate, wherein he attempts to prove that the Author of the said *History* was an *Heretique*, and *Atheist*. This procedure of his hath been laughed at every where, and *Cesar Aquilinius* a *Papist*, thus censures it.

*Cesar Aquilinius de tribus Historicis Concilii Tridentini.*  
p. 13, 19, 20.

“ An *Petrus Soave* fuerit *Hæreticus* an *Atheus*? *Questio-*  
“ nem hanc proponit *Henricus* initio præfationis ad suam *Censu-*  
“ ram, loquens enim de *Petro Soave*, hæc addit, *Scriptor Hære-*  
“ ticus an *Atheista*? nihil oportet inquirere: quare ipse *Que-*  
“ stionem hanc ut superfluum contemnendam potius quam examinan-

“ dam & determinandam judicat. *Palavicinus* vero existimans  
“ statim uno ictu adversarium, atque ejus *Historiæ* sternere auctori-

“ tatem, *Questionem* istam proponit, & solvit, asserens in primo in-

“ troductionis suæ limine *Petrum Soave* fuisse *Hæreticum*, &  
“ quod pejus est, *Atheum*: hoc etiam addit secundi voluminis in-

“ itio in epistola quam tribuit sui operis *Bibliopole*. Probat hoc  
“ ex quibusdam verbis *Manu-scriptarum* epistolarum, quæ juxta  
“ ejus sententiam *Petro Soave* tribuuntur. Verum satis stultè  
“ videtur incedere, & assimilatur ei, qui umbram insequitur  
“ relicto corpore: habet præ manibus *Historiam* *Concilii Tri-*  
“ dentini scriptam ab illo & typis datam, in qua tanquam in spe-

culo



## The Preface to the Reader.

culo posset cognoscere, *quanam sit Petri Soave Religio? An Catholicus, an Hæreticus? An fortasse Atheus?* & laborat apud nonnulla privata manu scripta, *quæ vel vera non sunt, vel certe ancipitis expositionis.* — Primus igitur Palavicini *ictus satis vanus & inutilis est, & ipse videtur assimilari homini, qui cum non valeat suis viribus inimicum vincere, utitur clarioribus, & maledicis vocibus: debuisse solum respondere ad opposita, quæ in illius Historiâ inveniuntur, & non laceßere hostem injuriis & imitari prudentiores, ac Sanctos Scriptores adversus Hæreticos, qui relictis injuriis tantum eorum doctrinam confutant ac damnant.* —

In fine, I was so far from being daunted at those rumors and threats, that I enlarged much *this Book* thereupon, and resolved to charge the *Enemy* home, when I saw how *weak resistance* I should meet with. I knew that *recriminations* were no answers; and that a *sober vertue* needed not to stand in fear of any *aspersions*. I understood well that the passages of a life like mine, spent in different places with much *privacie* and *obscurity*, was *unknown to them*; that even those *actions* they would fix their greatest *calumnies* upon, were such as that they understood not their grounds, nor had they *learning enough and skill in casuistical Divinity* to condemn: that it would be *imprudent in them* to look beyond the *Act of Indemnity and Oblivion*, which was more necessary to many of the *Royal Society* than to me; nor can their *deportment* be justified, as mine, who joyned with no party, frequented no *Conventicles*, writ very *honorably concerning the Episcoparians*, and pleaded for their *\* Toleration*: I was at *Westminster-School* when the late *King* was *beheaded*: I never took *Covenant*, nor *Engagement*. In sum, I SERVED MY PATRON; I endeavoured to express my *Gratitude* unto him who had *relieved me* being a *Childe*, and in great poverty (the *Rebellion in Ireland* having deprived my Parents of all means wherewith to educate me) who made me a *King's Scholar*, preferred me to *Ch. Ch. C. in Oxon.* who often supplied me with money, when my *tender years* gave him little hopes of any return, and who protected me amidst the *Presbyterians* and *Independants*, and other *Seßs*, with none thereof did I

'Tis a kind of  
Impiety to dis-  
turb the bu-  
ried: and of-  
tentimes the  
exposing of  
things to the  
Air that have  
been long kept  
close, or the o-  
pening of Tombs,  
hath raised va-  
pours so pesti-  
lential that  
they have al-  
most ruined  
flourishing  
Kingdoms and  
Seignories.  
\* See my pre-  
face to the  
Good Old  
cause.

*The Preface to the Reader.*

contract any relation or acquaintance : my familiarity never engaged me with ten of that party, and my genius and humor inclined me to fewer. I neither enriched, nor otherwise advanced my self during the late troubles, and shared the common odium, and dangers, not prosperity with my Benefactor. I believe no generous man, who hath the least sense of bravery will condemn me ; and I profess, I am ashamed rather to have done so little, than that I have done so much for him that so frankly obliged a stranger, and a childe. When Gracchus was put to death for sedition, that faithful friend and complice of his was dismissed and mentioned with honour by all Posterity ; who when he was impeached, justified his Treason by the avowing a Friendship so great, that whatever Gracchus had commanded him, he would not have declined it : and being further Questioned, whether he would have burned the Capitol at his bidding ? He replied again, That he should have done it ; but Gracchus would not bid such a thing. They that knew me heretofore, know I have a thousand times thus apologized for my self : adding, that in Vassals and Slaves, and persons transcendently obliged, their Fidelity exempted them from all ignominy, though the principal Lords, Masters, and Patrons might be accounted Traitors. And I am so far from dreading the Censure of the world (especially from Cavaliers) that I believe most men wish their favours so well placed, and that in their exigencies they might meet with as brave acknowledgments. My Youth and other circumstances incapacitated me from rendring him any great Services ; but all that I did, and all that I writ, had no other aim than his interest ; nor do I care how much any man can inodiate my former Writings, as long as that they were subservient to him.

I think this defence to be the most proper and seasonable that I can now make ; and I will not suffer my self to be engaged in any Disputes that may contribute to the dissettlement of this Nation, and Monarchy ; it will therefore be but meanly done  
to



*The Preface to the Reader.*

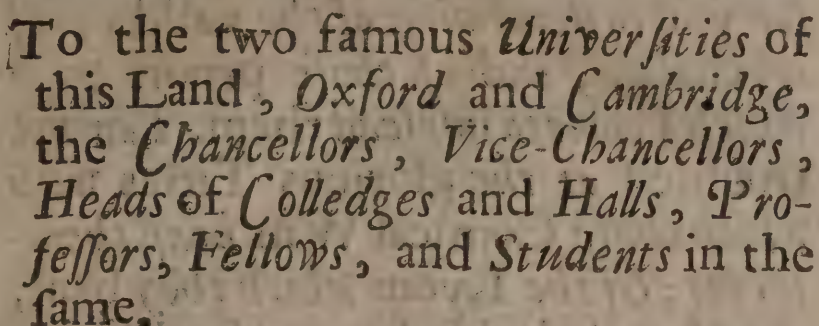
to assault what I now abandon ; and to revive the mention, nay, perhaps to contrive any answer (after so many years omitting it) is scarce prudential. I have been confirmed by the Right Reverend father in God the Lord Bishop of Winchester, and they that would write my life well, must consult that excellent Prelate, and a Letter which He hath of mine : I have lived in Communion with the Church of England hitherto, as standing upon the foundations laid by Qu. Elizabeth ; and my neighboring Diocesans of Worcester and Lichfield can certify with how much respect I have demeaned my self to them upon occasion ; and I abhor all thoughts but such as shall contribute to the support of the Monarchy, the Protestant Religion, the Honor and welfare of these Kingdoms. Having made this Declaration, let them (or more able men than they) write against any piece of mine which hath been published since his Majesties restoration, and consider the manner of my assertions ; and let them write the life of a man who hath some virtues of the most celebrated times, and hath reserved himself free from the Vices of these, I shall not regard their malice, nor value the indulgence of a sort of people whose credit (since the Answer to Mr. Sorkier, the History of the R. S. the Calumnies against Aristotle, and the Plus Ultra of Mr. Glanvill) cannot equal that of Amadis de Gaule, King Arthur, Timæus, or Schioppus. All that they shall say of this nature will be notorious, and illiterate malice ; and my Reply shall be a scornful silence.

I shall add now, that in such times as I thought it our interest to subvert the Monarchy of England, and the repute of the Clergy, I was passionately addicted to the new Philosophy, and motioned several ways for the introducing it amongst the Gentry and youth in this Nation ; I was confident that it would render all the Clergy contemptible, and take from their esteem and reverence in the Church, whilst they must seem egregious fools in matters of common discourse ; nor did I question but the Authority of all Antiquity in spiritual affairs would vanish when it appeared how much they were mistaken in the common occurrences and Histories of Nature. How rational this opinion of mine was, and how it is verified in these days, let the Hierarchy and Universities judge.

To







**T**He goodness of the Quarrel I am engaged in makes me fear no Judges ; but yet to chuse the most competent : I am secure of the honest and true ; but submit the decision to the learned and prudent. All that are sensible of those studies by which the Morality, Religion, and Civil Policy of this Nation hath been carried on happily before these Impertinents & Innovators ; and how this Nation is declined and debauched from every thing that is serious and sober now , are convinced of the justice of my complaints, and how necessary it was that some body

body should attacque them ; but it is  
for you to determine of the validity of  
my charge , and of those proofs with  
which I come to implead them. I am not  
troubled at the glorious Titles with  
which these Comical Wits boast them-  
selves ; Of the Lyons which they bear,  
they have only this faint resemblance,  
that they are not so brave as they are  
painted I have stooped the Talbots  
(your Supporters) for them, and if they  
ever hunt well hereafter , this Age  
knows whom they are obliged unto.  
The name of Virtuoso signifies as little  
with me, as it does in Italy , where they  
will bestow on a Pastry-Cook or Mil-  
lener, even with that fair accessional of  
molto Illustre; But it seems a little too  
open and palpable to fetch the project  
of the Society from Italy , and their  
name too : though Campanella contri-  
ved the former, yet would He not have  
advised them unto the latter ; and if  
their



*their invention were so barren as not to suggest unto them a fitting denomination, they might without robbing meaner Artizans, have borrowed one from the Academy of Perugia, or some where else there, and stiled themselves the I N S E N S A T I, &c. It is manifest now that the Antient Learning ( and not only the Natural Philosophy ) is the Rubbish they would remove ; This work they have so diligently pursued, as if they had forgot  
“ Their first and chief Employment,  
“ carefully to seek, and faithfully to  
“ report how things are *de facto* —  
This Specimen acquaints you with what integrity they perform their undertakings; and if the Ensamples they exhibite to the world, whilst They are yet probationers for the glory of Natural Philosophers, if they be so faulty. what estimate may we rationally make of those that are laid up in the Treasu-*

*A*

*ry*

Mr. Glarvill:  
pag. 91.

I shall hereaf-  
ter give the  
world an exa-  
men of the rest  
of the hi-  
story: and I  
design to try  
them by that  
piece.

ry of *their* Archives? Mr. Glanville  
tells us, that " They have done more  
" than all the Philosophers of  
" the notional way, since *Aristotle*  
" opened his shop in Greece: which  
" saying (*he adds*) may perhaps look  
" to some like a bold and fond sen-  
" tence; but who so ever compares the  
" *Repository* of this *Society*, with all  
" the volumes of the Disputers, will  
" finde it neither immodest nor un-  
" just; and their History hath given  
" us instances sufficient of their *Ex-*  
" *periments* and *Observations*, and *In-*  
" *struments* to justifie a bolder affir-  
" mation. ----- I am indeed apt to be-  
lieve that all the Philosophers of the  
notional way in Greece, Alexandria,  
Arabia, Spain, and the rest of Europe,  
neither have, nor would have attempted  
anything like to what they have done;  
and when I reflect upon the lamentable  
narratives and proposals which their  
History,



*History, the Transactions and other Books of theirs represent unto us, I think they purpose to grow famous, as the Turks do to gain Paradise, by treasuring up all the waste paper they meet with. But I shall not anticipate your censure, nor endeavor to prepossess you against them by the sense of your interest, nor exasperate your passion any way: Be as unbyassed as it is possible; Be as Loyal and Monarchical, as any English-man imaginable; Be as great friends as you can to the Protestant Religion, sober vertue, and the real Honor and utility of these Kingdoms; I wish for such Arbitrators; and your Sentence shall never be declined upon those accounts, by*

Warwick Octob. 6.  
1669.

Your affectionate humble Servant.

*Hen. Stubbe.*







A

# Specimen of the *Animadversions* upon the History of the Royal Society.

**E**picurus and those of his followers which declined the  
(a) entermedling with such employments as related (a) Vide Dio-  
unto the Government of their Countrey and Civil Po-  
licie, did agreeably to their inclinations and principles, gen. Laert. l. x.  
flight and vilifie all that *paideia* or (b) course of studies consist- & notas Mena-  
ing of Grammar (which in its extent included all Criti- gii pag. 275.  
cal Learning, History and Chronology) and Rhetorick, and Vid. Diog.  
Logick, and even Mathematicks. That great Epicurean Philoso- Laert. ubi su-  
pher Metrodorus had the confidenceto (c) write unto one, pra-Menagii  
that whereas he was ignorant of the first Verses in Homer, and notas pag. 260.  
understood not whether Hector were a Trojan or a Grecian Com- 274. & Vos.  
mander, nor any of those things almost which were the subject of de Phil. Sect. c.  
common discourse and knowledg, yet he should not be troubled there 8 Sect. 2, 3, 7.  
at. We have seen in this Age not only the Philosophy, but the c Plutarch. in  
Ignorance of that Sect revived, but with this disparity, that libello quod  
wheras the former Epicureans did own & avow their being unac- non potest sua-  
quainted with that sort of Literature, our Modern Insolents pre- viter vivi se-  
tend to understand it in such perfection, that the Empire of Lear- cundum Epicu-  
ning as well as of Wit, and solid Philosophy should seem inclu- rum.  
ded in the same walls. But how vain such their pretensions are,  
and how justly I charge them with the imputation of ignorance,  
is apparent to any that are conversant with the Books that  
wear their Name, and by their ordinary Discourses. I shall vin-  
dicate my Censure by instancing in those pieces which had more  
than one Comical Wit to pen them, and which if they be not the  
most elaborate & substantial that it is possible for that sort of men  
to produce, the world must suspect henceforward their discre-  
tion, as much as now their abilities. The History was many  
years in writing, and the Author assures us, he had no mean as-  
sistants in that work: Mr. Glanvill wanted not a convenient  
space

(\*)

pag. 170.

pag. 7.

d Conringius de  
Medicin. Her-  
metica.

space of time to perfect his *Plus ultra*; he consulted with several of the *Virtuosi* for materials wherewith to advance their *Renown*, and silence not only his opponent, but all opposites against the *Royal Society*. I know some that he writ unto about it, and others saw his papers as they were remitted unto him, *blotted* and altered. The result of all which their care and pains is, that whereas some only imagined that these men were a company of *talkative* and *superficial* — now it is become past denial by any body. Who can with any patience read how this famous *Society* sent to the Governor of *Batavia* in the *East-Indies* to know what grows in *Mexico* in the *West-Indies*? How poor and mean are their inquiries, not such as serious men design to erect a *Natural Philosophy* upon, but to yield empty fellows, and the *Impertinent* matter for *Table-talk*! Just so when I went to *Jamaica* and desired that Honorable Personage Mr. *Robert Boyle* to procure me some directions for *Philosophical* inquiries in that Countrey; He, with blushing and disorder, tendered me from them a ridiculous paper which concerned most some particularities of *China*, and those *Oriental* parts: Had not that paper been lost, I would have printed it; but if they please to remember it, it is about half a sheet of *Instructions* given to an *East-India* Captain, and beyond any *Almanack* were to serve for all *Meridians*, and *Countreys*; though the enquiries were specialties. I can scarce endure to hear Mr. *Sprat* tell us, that the graver and more reserved *Egyptians* did confine their *Philosophy* to their *Temples*. There is a great noise made by some concerning the antient *Hieroglyphical* Learning of the *Egyptians*; but I never heard that it was confined to their priests by the graver Authority; but rather that a company of cheating lying Rogues did make fools of the people, and by pretences of a sacred and mysterious Character amused them: they had little of *Natural Philosophy*; somewhat more of *Geometry* and *Astronomy*: all their Knowledge amounted not to much, as *Conringius* hath (d) demonstrated; and after that the Successors of *Alexander* had settled themselves in *Egypt*, that *foppery* decayed, & the grave *Egyptians* at *Alexandria* endowed the professors of *Physick* and sundry *Philosophies* there, (the place or Colledge was



was called *Museum*, *Strabo lib. 17.*) and erected *Libraries*, and furnished the *Roman Empire* with *Physicians* to the days of *Va-*

*lentinian*, and (c) *Domitian* with *Books*. But it were *unpardonable* in a common *School-boy* to pass by the *Jonique* and *Ita-*

*lique Philosophers* un-mentioned; and to tell us, "That in *Greece* the most conside-

“*rable (and indeed the only successful) trials*  
“*were made at Athens?* Whereas, if we regard *Natural Philosophy*, and abstract from the Experiments of the *Aristotelians*, there was never any thing in *Athens* could compare with the discovery that

*Thales*, *Anaximander*, *Anaximenes* and *Anaxagoras* made, which were of the *Jonique Sect*: and since the *Dialect* in which he writ (not the place of his *Nativity*) authorizeth me to do it, I shall reckon *Hippocrates* amongst the *Jonian Philosophers*, and *Mr. Sprat* may be certain he is not to be accounted for in *Athens*. And as to the *Italique* and *Elea-*  
*tique Sects*, dare any man say they, that they were inferior to *A-*  
*thens*, or that their trials were *un-successful*; who knows the performances of *Pythagoras*, *Empedocles*, *Acron*, *Parmenides*, *Melissus*, *Leucippus*, *Democritus*, *Ocellus*, *Lucanus*, *Archytas*, *Ar-*  
*chimedes*, &c? At *Alexandria* (a place we may not improperly reckon in *Greece*, since not only *Mr. Sprat* omits the mention of those Professors as *Egyptians*; but they writ in *Greek*, fol-

lowed the *Grecian* (f) account and customs; not *Egyptian*; and as *Athenaeus* shews (lib. 4.) taught *Greece* it self *Philoso-*  
*phy* and the *Liberal Arts*) if we remember that it was the seat of (g) *Euclid* the *Mathematician*, and there is scarce one *Mathematician* re-

corded but was related to *Alexandria* as *Vossius* shews. “*Valde autem illud com-*  
“ *mendat Scholam ab Euclide erectam A-*  
“*lexandriae, quod non solum multos reli-*  
“*querit discipulos; de quo auctor Pappus in septimo collectionum*  
“*Mathematicarum; sed ab ejus tempore, usque ad tempora Sarra-*

e *Domitianus* — misitque *Alexandri-*  
am qui exemplaria describerent; emen-  
darent. Ita discimus tempore *Domitiani*  
non caruisse *Bibliotheca Alexandriam*;  
nam semper *Urbs illa* professores plurimos  
aluit. *Pag. Gaudunt. de Philos. apud*  
*Roman. c. 163. p. 456.*

pag. 7.

I believe the *Cyrenae Philosophers* in the  
Court of *Dionysius* made very successful  
Experiments: and their number is paral-  
lelled by *Lyssus* (if my memory fail  
me not) in his *Stoical Annudition*, so  
any that *Ath. n.* ever saw.

f *Euclides. Mathematicus floruit tempo-*  
ribus *Ptolomaei Lagidae*, eoque regnan-  
te primus *Alexandriae* docuit *Matheseon*: ut  
ex *Proclo diadocho* videre est. *Voss. de*  
*Phil. Sect. c. xi. Sect. i.*

cenica

“cenica vix ullum invenire sit nobilem Mathematicum; quin  
 “vel patria fuit Alexandrinus; vel saltem Alexandriae de-  
 “derit operam Mathesi. Voss. de Scient. Mathemat. c. 15. pag.  
 “52. The same is avowed by Sir Henry Savil in his second  
 “Lecture. “Post Euclidem exivit Archimedes — & E-  
 “ratosthenes. Hos insecuti Apollonius Pergæus, Geminus,  
 “Theodosius, Menelaus Geometra dictus, & alii ex Schola fere  
 “Alexandrinâ profecti omnes, usque ad tempora Sarraceno-  
 rum. There flourished Herophilus and Themison, and  
 Dioscorides, and many other Professors of Physick, Ana-  
 tomy, and Philosophy (even Chymistry, and the Philosophers-  
 stone) ’tis extreme imprudence to mention Athens thus! But, to  
 gratifie him further than he deserves or can expect; to yield  
 that up to Aristotle and his Peripatetick followers in Athens  
 which cannot seem due to such as (b) spent their time in idle  
 talking and wandring under the fruitless shadows of nature, in  
 their first institution, (as their successors have done ever since) and  
 were utterly useles in respect of the good of man-kinde. To grant  
 our Virtuoso more than the walks, porches, and gardens he prates  
 of, do merit, what a stranger is he in the History of Philosophy,  
 and how ignorant of the Subject he discourseth about, not to know  
 what Dialects the Grecian Philosophers writ in, nor how ele-  
 gant was their style? Some used the Jonique, others the Do-  
 rique dialect, and those embased several ways according as  
 their humors, their Countreys, or the novelty of the Subject put  
 them upon it: And even at Athens, neither the Stoiques, nor  
 Epicureans were so solicitous about Rhetorick, as to chuse that  
 for Philosophy which they could most eloquently express. And  
 since Plato had his λέξεις, and Aristotle his ἱστέμματα and other  
 terms and expressions, ’tis hard to think that they did so regulate  
 their Philosophy by their regards to the ornaments of speech, as  
 Mr. Sprat imagines. How comes it to pass then that our Hi-  
 storian intimates to us (’tis a “new invention! to give the Co-  
 “mical wits their due, though fooleries) that the Athenians

Mr. Sprat. pag.  
 327, 817.

Did the Athe-  
 nians teach  
 Hippocrates, or  
 Democritus to

“were the (i) Masters of the Arts of speaking to all their Neigh-  
 “bours [which is false concerning the Jonians, and probably  
 “of some others] and so might well be inclined, rather to chuse  
 such



“such opinions of Nature, which they might  
“most elegantly express, than such which  
“were more useful, but could not so well be  
“illustrated by the ornaments of Speech.

Mr. Sprat further informs us, (and who  
can deny him to glory of being the first  
discoverer ? ) that “in the City of Athens  
“the knowledge of Nature had its Original  
“before either that of Discourse, or of hu-  
“mane Actions. — This is notoriously false; for it is mani-

fest that Anaxagoras Clazomenius first brought from Miletum  
news of Natural Philosophy to Athens, teaching it to Pericles  
and Euripides : and before that time there were Orators, and  
Moral Philosophers, as certainly as ever there was a Solon, or  
(1) the Sophists at Athens.

I must profess here in the Introduction that 'tis an hard thing to  
write against men that understand nothing : and that it is not my  
present intention to manifest all those mistakes against common  
reading and Literature, which are in that History. I shall insist  
now but on some, but such as are so gross as to justify the most  
harsh of my censures, and to gain a belief from my Reader, that  
those who could not prevent these saylors may be guilty of an in-  
finite more. I appeal unto my Reverend and Learned School-  
Master Dr. Busby at Westminster; whether he, or any other  
Learned man, would have admitted of, much less have ap-  
plauded such an Exercise as Mr. Sprat offers to his Majesty by  
way of Dedication ? Do a few empty though smooth-placed  
words make up all Rhetorique ? Is this Nation sunk so low, that  
non-sense and ignorance can be voiced for the most Exemplary  
Eloquence that late years have published ? Oratio, si res non sub-  
est ab oratore percepta & cognita, aut nulla sit necesse est, aut om-  
nium irrisione ludatur. Quid enim tam furiosum, quam verborum  
vel optimorum atque ornatissimorum sonitus inanis, nulla subiecta  
sententia aut scientia ? The Epistle follows, and is this.

write ? did these two shew so great a  
care of eloquent language that they chose  
their Philosophy accordingly ? Or did not  
the one in the Ionique, the other in the  
Dorique phrase joyn many words and ex-  
pressions thereby to describe their Philo-  
sophical sentiments. Read over, Oh ! tres-  
haute & tres-agreeable virtuosi Diogenes  
Laertius, & Focsius before you tell these  
Stories.

k Vossius de  
Phil. Sect. c. 5.  
Sect. 7.

l Isocrat. in  
orat. περὶ  
ἐκείνων.

cicero de ora-  
tor. l. 1.

# The Dedication of the History of the Royal Society unto his Majesty.

To the King.

SIR,

**O**F all the Kings of Europe, Your Majesty was the first, who confirmed this Noble Design of Experiments, by Your own Example, and by publick Establishment. An Enterprize equal to the most renown'd Actions of the best Princes. For, to encrease the Powers of all Mankind, and to free them from the Bondage of Errors, is greater Glory than to enlarge Empire, or to put Chains on the Necks of Conquer'd Nations.

What Reverence all Antiquity had for the Authors of Natural Discoveries, is Evident by the Diviner sort of Honor they conferr'd on them. Their Founders of Philosophical Opinions were only admir'd by their own Sects. Their Valiant Men and Generals did seldom rise higher than to Demy-Gods and Heroes. But the Gods they worshipped with Temples and Altars, were those who instructed the world to Plow, to Sow, to Plant, to Spin, to build Houses, and to find out New Countries. This Zeal indeed, by which they express'd their Gratitude to such Benefactors, degenerated into Superstition: yet has it taught us, that an higher degree of Reputation is due to Discoverers, than to the Teachers of Speculative Doctrines, nay, even to Conquerors themselves.

Nor has the True God himself omitted to shew his value of Vulgar Arts. In the whole History of the First Monarchs of the world from Adam to Noah, there is no mention of their Wars, or their Victories: All that is recorded is this, they liv'd so many years, and taught their Posterity to keep Sheep, to till the Grounds, to plant Vineyards, to dwell in Tents, to build Cities, to play on the Harp and Organs, and to work in Brasse and Iron. And if they deserved a Sacred Remembrance for one Natural or Mechanical Invention, Your Majesty will certainly obtain Immortal Fame, for having established a perpetual Succession of Inventors.

I am, &c.

THO. SPRAT.



## *Animadversions upon the Epistle aforesaid.*

**I**T is a sign that our *Virtuoso* is little acquainted with the condition of Europe, and that the Intelligence of these *Curious* is as bad or worse than ever deceived the *Man of Stagyra*, in that he says, that of all the Kings of Europe his Majesty was the first, who confirmed this Noble design of Experiments by his own example. — Had

not the Emperor Rudolphus a Colledge of Chymists to promote Natural and useful Experiments in Physick and Philosophy, did he not oftentimes work himself in those Laboratories where they had Rulandus and others for his assistants? take the testimony of one that was present with him. *Nec attinet superiorum annorum Imperatores, Principes, & totam Nobilium familiam citare; cum manifestissimum sit, multum studii, laboris, diligentiae atque sumptuum in nobilissimam hanc artem [Chemiæ] collocasse Augustissimum nostrum Casarem Rudolphum adducere licebit, quem publica fama passim constat, artem hanc Alchemia impense amare, artificiumque studiose de his exquirere, non raro ipsa Chymica aggredi, tractandaque nec dedignari.* — Did not Alphonso the last King of

that name in Naples try many Experiments in his Gardens? and when he poorly abandoned his Countrey and Riches to the French, did he not (admire him, O ye Comical Wits!) did he not with several choice Seeds remember to ship some excellent Bottles of Wine, and so retired to Sicily? Did not King Charles the First encourage and assist Dr. Harvey in the Disquisitions about the Circulation of the Blood, and Generation of Animals? Hath not there been at Florence an Academy for Experiments in all manner of Philosophy promoted and kept on foot by the Ducal Family? Is there not, by the encouragement of the Popes, a Laboratory and Colledge of Jesuits at Rome, whose great work

Mr. de Silhon in the second part of his *Minister of State*, disc. 7. observeth, but commends not the Emperor Rudolphus, in that he made a Shop and Forge of his Cabinet, and reduced all his Imperial thoughts into the search of the Philosophers-stone, and to make Watches and Dyals.

Martin. Ruland. in dedic. ad progymnasma. Alchemiae.

hath been for many years to enquire into all *natural Curiosities*? is it not there that *Schoinerus*, *Kircherus*, *Ricciolus* and others have flourished before ever this *Royal Society* was thought upon? How long hath the Duke of *Holstein* kept up his *Laboratory* and *Chymical Colledge* at *Gottorp*? If all these be not *Crowned heads*; yet there are enough of them to take off from the generality of the assertion made by our *Virtuoso*; and the rest serve to extenuate the complement: But if I had gone about to reckon the *Cyrenaic Academy* under *Aristippus* at *Sicily*, and the *Colledge of Virtuosi* under *Petronius Arbitr* in *Rome*, as the establishments of *European Princes*; *Dionisus* and *Nero* had quite spoiled the flattery of this saying: yet any one that hath read *Plutarch*, *Suetonius*, or *Martial*, can tell the exploits of those *Mechanick Philosophers*, and how they depraved one of the best *Emperors* in the world.

Read the life  
of Nero in *Suetonius*, and reflect upon it.

As for the *publique Establishment* of these *experimental Philosophers*, I do grant that our *King* was the first that did such a thing: but the formality of a *Charter*, their *President* and *Mace*, and other such circumstances make more for their *Grandeur*, than the *King's glory*, except that the usefulness of the design appear: the *ignorance* and *folly* of these *Comical Wits*, the *Members* of it hath more of *disgrace* in it, than there is *honour* in the whole foundation; it being more for his *prejudice* that it should be proclaimed abroad (as 'tis by this *Historian* and *Mr. Glanvills* writings) that our *Nation* are a generation of *illiterate fools* and *Coxcombs*, than 'tis for his *credit* that they have *inutile and insignificant desires* after knowledge.

"An enterprise equal to the most renowned actions of the best Princes. — I have oftentimes reflected upon those Actions whereby Princes have acquired the fame of great, and good, but I never found any that gained either of those *Elogies*, by any *knick-knacks* of *Experimental* or *Mechanical Philosophy* alone: there have been some that making some of these inquiries of their *innocent divertisement*, & by doing all those actions which gain a repute of *political wisdom*, *courage*, *justice*, *piety*, &c. have transmitted an *honorable memory* of themselves: but these *traghams* as they are contra-distinct to *sober* and *substantial*

*virtue*,



virtue, are so far from being *Actions equal to the most renowned enterprises* of the best *Princes*, that they do not expiate for other *their faults*: as any man may learn from the lives of those *infortunate Princes*, *Dionysius* and *Nero*. What writer advanceth the *repute* of *Alphonso*, or justifies him for *murdering* and *oppressing* his *Subjects*, and losing his *own*, whilst he kept his *Garden*? Is *Diosletian* more famous for those *ingenuities*, or infamous for his *persecution of the Christians*? I do not think that the *establishment of this Society*, (had all things answered *mens wishes*, and out-done *their hopes*) would have been mentioned with so much honour as the most *renowned actions* of the best *Princes*: since the *actions* that relate to *goodness* and *piety* admit of *no comparison*, (being of different *Natures* and *kinds*) but when a fool, (as here a *Virtuoso*) holds the Scales. I should not pardon my self, should I oppose the *Heroicalness* of this *enterprise*, with the *actions* of *Constantine* railing *Christianity*; with those of *Justinian* or *Theodosius* in compiling their *Codes*: with the *actions* of our *Black Prince*, or *Henry the Fifth*: or with *Henry the Eighth* in *demolishing Abbies*, and rejecting the *Papal Authority*; or *Queen Elizabeths* exploits against *Spain*: or her restoring the *Protestant Religion*, putting the *Bible into English*, and supporting the *Protestants beyond Sea*: It is not for any man that pretends to be an *Aristotelian*, to make such *comparisons*; much less to infer as *Mr. Sprat* does. But the reason which he gives why the *establishment of the Royal Society of Experimentators* equalleth the most *renowned actions* of the best *Princes*, is such a pitiful one as *Guzman de Alfarache* never met with in the whole extent of the *Hospital of Fools*.

“For, to increase the Powers of Mankind, and to free them from the bondage of Errors, is greater glory than to enlarge Empire, or to put Chains on the necks of Conquered Nations. —

These Consequences are twisted like the cordage of

Ocnus.

I Would fain know whether the making of a Golden-Chain of 43 Links to the chain, the Lock and Key being fastened and put about a fleas neck, she drew the same, all which, Lock, Key, and Chain weighed but one grain and an half; as *How* relates in his *Chronicles* of *Queen Elizabeth*. *Ann. Regn.* 18. 1576: yet whether did his invention (surpassing all ever heard of the *R. S.*) render *Mark Scalliot* (the author) equal in glory or renowned to his *Sovereign Princess* and her best or most famed *actions*; neither is it voyced as the most important achievement of her *Reign*, though it were an unusual improvement of the Powers of Mankind, over *Rebellious* and *veracious Fleas*.

Ocnus ( the God of sloth ) in Hell, which are fit for nothing but to fodder Asses with. If our Historian mean by every little invention to encrease the Powers of all Mankind, as an enterprize of such renown; he is deceived: this glory is not due to such as go about with a dog and a hoop: not to them which keep duncing Horses and Bears; not to the practisers of Leger-de-main, or upon the high or low rope, not to every Mountebank and his man Andrew: all which with many other Mechanical and Experimental Philosophers, do in some sort encrease the Powers of Mankind; and differ no more from some of the Virtuosi, than a Cat in a hole doth from a Cat out of an hole; betwixt which that inquisitive person Asdryasdust Tossoffacan, found a very great resemblance. Neither is it worth the while to go about to dis-abuse Man-kinde about every little error: to rectifie every vulgar mistake about natural Phænomena, this is an enterprize God never delegated any man unto; Moses who was faithful in all his Reiglement omitted the contrivance of our illustrious Society: Christ and his Apostles mentioned it not, but were content by their Language to countenance those Vulgar Locutions, the Resurrection whereof is now so Renowned and Important. It is the Utility of Inventions that acquires a Value to them. 'Tis not the encreasing of the Powers of Man-kinde by the project of a Diving-bell, which our Nation holds Equivalent to the ending of a War, at the first Battle. 'Tis not a Pendulum Watch, nor Spectacles whereby divers may see under water, nor the new Ingenuity of Apple-Roasters, nor every Petty discovery or Instrument of Ingenious Luxury must be put in comparison, much less be preferred before the Protection, and Enlargement of Empires.

“ That all Antiquity had such a Reverence for the Authors  
 “ of Natural discoveries, as to bestow a Diviner sort of Honour  
 “ upon them, that the Gods were worshipped with Temples and  
 “ Altars, were those that instructed the World to Plow, to Sowe,  
 “ to Plant, to Spin, to build Houses, and to find out New Coun-  
 “ tries. ——— This is a tale hath so much of Ignorance in  
 it, that I believe no School-boy ever uttered the like. The  
 Task is difficult, if not impossible to state the several distinctions  
 of



of the *Paynim Gods*; and to adjust unto them their *Honors*, according as they are distinguished into *Dii Longentes* or *Majorum Gentium*: and the *Semi-Dei* and *Heroes* and the *Semones*: It is true that amongst the principal *Gods* these are recounted,

*Juno, Vesta, Minerva, Ceres, Diana, Venus, Mercurius, Jovis, Neptunus, Vulcanus, Apollo.*

And although it be true that most of these were *Autors* of *Natural discoveries*, yet it is first observable how all *Antiquity* had such a *Reverence* for them that were eminent for *Moral vertues*, *civil Prudence*, and those *Qualifications* that inable a *Prince* to *Govern well*, that they made *Jupiter* to be the chief of all the *Gods*, and the most powerful of them all, whose *Fame* lay in the *Arts of Government*, in his *Governing* his *Subjects* in *Crete* with due admiration of *Justice*, in preserving his *Land* and *Naval-Forces*, in advancing of *Commerce* and all those *Sciences* that are useful in a *Society*. They made *Jove* the Father of *Pallas*, and *Mercury* the Deities of *Artisans* and *Mechanical Philosophers*. It is false that the *Gods* they worshipped with *Temples* and *Altars*, were those that instructed the world to plow, to sow, &c. For it is evident that all these *Honors* were conferred on such as were not *Inventors*, so that he makes an *Antithesis* where there is none. For the deified *Emperors*, the *Heroes* and *Semi-Dei* shared all these *Honors* with the greatest *Gods*, and some of them in as eminent a manner as most of the others; which any man knows that understands what veneration *Hercules* was in, and what *Tenets* were vowed to him, and what *Priests* he had: Every *Writer* almost tells us of *Temples* or *Fanes*, called *Ἡρώα* erected for the Honor and the Worship of the *Heroes*; also of their *συνοδοί*, & *ἱερῶν*, of their *Sacrifices* and *Festivals*, *ἡ δὲ πόλις ἐν ἱερῶν καὶ τῶν δὲ δῶνασιν ἀγῶνας καὶ ἱλυσίας δούκας*. He was not deified for his *Natural Philosophy*, of whom *Virgil* saith,

The *Dii Majorum Gentium*, or those whom *Tully* reckons upon as having gained a worship generally before the world was aware, and he opposeth them to such as by their merits gained adoration: so that they were not worshipped as *Inventors*.

If you read the *Dedications* of *Altars* to *Augustus*, and other *Heroes*, you will see the *Laws* of them were the same with those of *Diana* in mount *Avantine*. See *Rosinus Antiquit. l. 2.*

*Thucid. l. 5. vid. Hen. Steph. in vocibus Ἡρώα, ἱερῶν, ἱλυσίας, ἡρώα, ἡρώων.*

*Nempe*

Eclog. 1.

*Nempe erit ille mihi semper Deus; illius aram  
Sape tener nostris ab ovilibus imbuet Agnus.*

It was the same person to whom Horace relates:

*Viventi tibi maturos largimur honores,  
Jurandasque tuum per nomen ponimus aras.*

It was not for such curiosities that Julius Caesar had his place amongst the Gods, and how he was worshipped learn from Maro thus:

Eclog. 5.

*Ipsa sonant arbusta, Deus, Deus, ille, Menalca.  
Sis bonus ô felixque tuis. En quatuor aras,  
Ecce duas tibi, Daphni, duoque altaria Phoebo:  
Pocula bina novo spumantia lacte quotannis,  
Craterasque duos statuam tibi pinguis olivi.*

*Hæc tibi semper erunt, & cum solennia vota  
Reddemus Nymphis, & cum lustrabimus agros.*

*ut Baccho, Cererique, tibi sic vota quotannis  
Agricola facient? damnabis tu quoque votis.*

It is manifest then to any man of common reading, that the Gods, the Antients worshipped with Temples and Altars, were not only those that did teach them to plant, &c. And it is observable, that such as were deified upon any such account gained such Honors in the most ignorant times and Nations: the more prudent generations, which deified the vertuous, the wise, the valiant, conferred no such respects upon every trivial Inventor of Mechanisms. Even Rome did so contrive the Temples of Vertue and Honor, that there was no ingress for a Virtuoso there: no coming at the Temple of Honor but through that of Virtue. And Tully when he recites those merits which advanced men to Heaven, he names them thus. *Ast olla, præter quæ datur adscensus in cælum mentem, virtutem, pietatem, fidem, earumque laudum delubra sunt.* Even when the deifying humor possessed ignorant Mortals, I can frame no other judgment of things, than that there was much of chance in their advancement: for oftentimes the greatest Inventions did not gain one those Honors which

Rosin. Aniq.  
Rom. l. 2. c. 19.  
Cicero de leg.  
l. 2.



which were payed to inferior discoveries. I do not finde that *Tiphys* who first built a Ship, or *Triptolemus*, who was unci monstrator or atri, had the honors of Demy-Gods: nor that *Perdix* who invented a Saw was deified, but when his Master cast him head-long from *Minervas* Tower in *Athens*, they feigned that he was turned into a *Partridge*, not a God: so that for ought I can perceive by this Story, had any man found out an *Ambling-Saddle*, he might have been thought converted into an *Owl*, instead of being worshipped with *Temples* and *Altars*. Neither was *Dadalus* so deified for his ingenious way of *pimping* for *Pasiphae*; nor *Perillus* for the *Mechanical contrivance* of the *Bull* of *Phalaris* the Tyrant. In fine, from the days that *Sparta* flourished to the Empire of the *Mancha* under the ingenious Author of the *Experimental History* of *Don Quixote*, I do not find that the little inventors of trivial and useles toys, though improvements of reall knowledge, and of the powers of all mankind, have had that honor which Mr. *Sprat* intimates. I shall recommend unto my Reader the description of a most accomplished *Virtuoso* in *Maximus Tyrius*, his name was *Mithecus*, Sermon 8. one not famous for ancient Learning, no Orator, Sophister, or notional Philosopher, but a man that was for the improvement of useful knowledge in Cookery, viz. *Hujus Sophista studium eo tendebat ut conficeret opus quod, quod voluptatem haberet unacum utilitate ipsa temperatum. Quippe qui concinnandis dapibus ita operam daret, ut escas acceptas ratione condimentorum temperamento, varietateque, atque ignis ministerio vescentibus jucunditatem praeberet meliores multo quam pro natura propria efficeret.* None can deny this person the repute of an eminent *Virtuoso*, an improver of the powers of man, and a discoverer of vulgar Errors, (I know a Member of the *Royal Society* who hath nothing in him but the skill to dress a *Carp* well) this man was admired by all Greece almost, but not deified: he met with no *Temples*, nor *Altars*, but coming to *Sparta*, he offered to reclaim them from their *Black Broth*, and wretched Cookery, and to instruct them in

These discoveries are greater than what our Royal Society have produced: so that they might have missed of *Temples* and *Altars* notwithstanding that they contrived the royal *Catherines*'s first Model, and built the double-keel'd Experiment; which how she carried her self upon a *tacque*, how she would bear up against the wind, how she would live in a great Sea, their Historian tells not, but puts us off with a *feh*.

*Maximus Tyrius*  
Serm. 8.  
citant Jacob.  
Mazonio de  
comp. Arist. &  
Platon. Sect. 7.  
pag. 356.

those dishes which might be called ( in the phrase of our *Historian* ) the *useful Arts of life*. But the Magistrates of *Lacedaemon* did summon *Minhecus* before them, and banished him immediately out of their Territories. I find in *Michael Cerrantes* in the Preface to the second part of the *Manchegal Experiments*, a narration concerning an ingenious person in Spain, who was esteemed as mad by his Neighbours, though he did those feats that that might have rendered him considerable to some of the Society, and gained him an immortal fame in philosophical transactions. The passage runs thus: "There was a Mad-man in *Sevil* which hit upon one of the prettiest absurd tricks that ever Mad-man in the world lighted on ; which was : he made him a Cane sharp at one end , and then catching a Dog in the Street or elsewhere , he held fast one of the Dogs legs under his Foot , and the other he held up with his hand. Then sitting his Cane as well as he could behind , he fell a blowing till he made the Dog as round as a Ball : and then, holding him still in the same manner, he gave him two claps with his hand on his Belly, and so let him go, saying to those that stood by ( which always were many ) how think you my Masters ? Is it a small matter to blow up a Dog like a Bladder ? However in this the most Dull Members of the Society are redervable to their *Historian*. He hath shewed that the Ancient *Pagans* did worship such Blocks as some are now ; and that those heretofore would have passed for *Heathen Gods*, whom all sober and Serious *Protestants* look upon as *Heathens*. Their *Founders of Philosophical Opinion*, he says were only admired by their own *Sects*. But although Mr. *Sprat* say it, I am assured that *Plato*, *Pythagoras* and *Anacharsis* were admired by more than ever saw them, or were their particular *Scholars*, and followers. That *Aristotle* might admire his Master, and *Pythagoras*, and *Democritus*, and *Socrates* ; that a *Stoique* might pay very great respect to *Epicurus*, is as credible, as that *Tully* should esteem the Friendship of *Atticus* ; or *Brutus* revere *Cassius* ; or *Seneca* expatiate in commendation of the Tutor of *Metrodorus* : or that the *Seven Wise men* should so admire the wisdom of one another, as to transmit the *Golden Tripes* from themselves and

Preface to the  
second part of  
the History of  
Don Quixote.

Mr. Sprat. p. 119



and followers, each to the other. But that those *Ancients* he so much talks of, did confer those *Diviner* sort of *Honors* upon the *Founders* of *Philosophical* *Opinions* and built some of them *Temples* and *Altars*, Mr. *Sprat* might have learned from *Tertullian*, who says, *Plerosque Autores etiam Deos existimavit Antiquitas, nedum Divos, ut Mercurium Egyptium cui praeipue Plato adsuevit: ut Silenum Phrygium cui a pastoribus perducto ingentes aures suas Midas tradidit, ut Hermotimum, cui Clazomenii mortuo Templum contulerunt; ut Orpheum, ut Musæum, ut Pherecyden Pythagoræ Magistrum.* But it is too much to expect that our *Virtuoso* and *Divine* should have read *Tertullian*. These are not times wherein men have will or leisure to look into these *Antiquated* *Studies*; to be *Wits* and agreeable company, to be *Poets*, to see, and understand and write *Plays*; to talk of and pretend to certain *Toys* and *Experiments*; these are *Cares* of such high concernment, that all *Philology* is but *Pedantry*; and *Polemical* *Divinity*, *Controversies* with which we are *Satiated*. Howsoever one would have thought the ordinary stock of *School-learning* might have instructed Mr. *Sprat* in the *Mythology* of the *Ancients*, better than to have ignored these things. He might there have learned that the *Thracians*, and particularly the *Getes* (the most *Just*, and most *Valiant* Nation amongst them) did deifie and offer *Sacrifice*, and pay all those *Honors*, which were held to be most *Divine* unto *Zamolxis*, who, whether the *Servant*, or *Predecessor* of *Pythagoras*, it matters not, since *Herodotus*, *Strabo*, *Laertius*, and the Author of the *Etymologicon*, all agree that he was reputed and worshipped for a *God*: *καὶ τὸν τίταν θεόν*. So saith *Strabo* of him: *ἡ γὰρ τῆς θεότητος*, saith *Laertius*; He was the *Founder* of *Philosophical* *Opinions*, if *Pythagoras* was a follower of his; and if *Pythagoras* taught him; he was the *Promulgator* of *Philosophical* *Opinions* in *Thrace*, and having taught them the *Immortality*, and *Transmigration* of *Souls*, and instructed them in their ways of worshipping *God*, without any mention of his *Experimental* *Philosophy*, it is averred that he gained the esteem and worship of a *God*. That *Hercules* was a *Philosopher* and disciple of *Atlas* who instructed him in the *Doctrine* of the *Sphere*, and *Astronomy*, is as confidently

De An. Ma. c. 61

Vid. Diogenes  
Laert. lib. 3.  
cum Notis  
Casauboni,  
Aldobrandini,  
& Menagii.

Id. Schrevelius  
in Virg.  
Aeneid. l. 1.  
vers. 745.

dently avowed, as it is *He was Deified*. So Schrevelius. *Constat enim Herculem Philosophum fuisse. Et ratio est, cur omnia illa monstra vicisse dicatur.* It is manifest that *Hercules* was a *Philosopher*; and for that reason he is said to have overcome so many *Monsters* (which were but *Monstrous Opinions*) and it is as notorious that for the subduing of those *Monsters*, he was reckoned a *God*, honoured with *Tithes*, *Temples*, *Priests*, and *Sacrifices*; That *Plato* derived all his repute from the *Inventive* and *Experimental Philosophy*, is a thing I yet understand not, but that there wanted not such as reckon him amongst the *Demy-Gods*, in a time when men had given over the *Deifying* of *Ratcatchers*, is certain. *Hunc Platonem Labeo inter Semi-deos Commemorandum putavit: Semi-deos autem Heroibus anteponebat, & utrosque inter Numina collocat. Veruntamen istum quem Semideum appellat, non Heroibus tantum, sed etiam Diis ipsis praefereendum esse, non dubito, so saith August. de civit. Dei. l. 2. c. 14.* And that man of *Stagira*, that *Idol* of *Disputers* is termed an *Heroe* by *Jul. Scaliger*, a man of as *inquisitive* and *Experimental* a *Spirit*, as any of this age or *Mechanical Society* ever produced. Read his *Character*, and despair of the like that it will ever be given to any of the *Virtuosi*, viz. *de subtil. exercit. 194. Sect. 4. Barbara ingenia levissimis momentis impelluntur ad Divini atque incomparabilis Herois Obtrectationem. Duae namque sunt Aquila sola, in natura rerum: altera bellica laudis, altera literaria; Illa potentia, hac Sapientia: Caesar & Aristoteles.* I am ashamed to be put upon the *Proof* of those things, which their *Country School-Masters* should have taught them, and so should have prevented me this trouble, which I find not yet to be at an end.

“Their *Valiant men* and *Generals*, did seldom rise higher than to *Demy-Gods* and *Heroes*. But the *Gods* they worshipped with *Temples* and *Altars*, were those who instructed the world to *Plowe*, &c. — By this *Antitbesi* any one will conjecture that the *Heroes* and *Demi-gods* had no *Temples* and *Altars*, which is a childish and unpardonable *Error*, as any *Boy* conversant in the *Roman Antiquities* will tell him, and I have shewed before: *Evander propter summam Sapientiam &*  
Erudi-



*Eruditionem, pro Deo cultus est ab Aboriginibus: imo Romani Divinos ei honores tribuentes aram Condiderunt, & quotannis Sacrificia obtulerunt, sicut & alii Heroibus iidem fecerunt, ut testatur Dionysius Halicarnassaeus, lib. Primo. Ara Evandri erat in colle Aventino. No man ever took Hercules or Zamolxis, or Castor and Pollux and Quirinus, or those Roman Emperors that were Deified, as Julius Caesar, Augustus, and others for more than Demi-Gods and Heroes, yet had they Temples and Altars, Priests and Sacrifices, as every School-boy knows. Let any man enquire into the Ethnick Theology, and see if the Authors of Natural Discoveries either exceed in number or dignity the Heroes and Demi-Gods who gained an *anobis* by their worth, by being Legislators, Generals, or Kings and Emperors: If they do not, (as 'tis certain they do not) what truth is there in what Mr. Sprat tells his Majesty, that a diviner sort of honor was conferred on them, than on the founders of Philosophical Opinions? And how far will they be to seek, that go to search Antiquity for proofs that an higher degree of Reputation is due to Discoverers, than to the Teachers of Speculative Doctrines, nay even to Conquerors themselves?*

*Demonst. Aniquit. Rom. l. 2. c. 17. de diis Indigetibus.*

*“Nor hath the true God himself omitted to shew his value of  
“Vulgar Arts; In the whole History of the first Monarchs of the  
“world from Adam to Noah, there is no mention of their Wars,  
“or their Victories. All that is Recorded is this, they lived so many  
“years, and taught their Posterity to keep Sheep, to till the  
“Ground, to plant Vineyards, to dwell in Tents, to build Cities, to  
“play on the Harp and Organs, & to work in Brasses & Iron, &c.  
I have already demonstrated the Ignorance of Mr. Sprat in Philology and humane Learning. Here he discovers himself to be as little acquainted with the Bible; and seems to have as little of Divinity, as other Scholarship in him. It is more than the Text warrants him, to say, That God Almighty mentioned those Discoveries out of his Value of those Vulgar Arts. Who made him Privy to the Secret Counsels of Heaven? or who impowred him to add to the Scripture? Dost he not fear lest God should add unto him the plagues that are written in that Book? Revel 22. 18. It was good advice which Agur giveth. Add not to his words, Prov. 30. 6.*

*l. 2.*

Such is the  
pulverising of  
Gold, when  
Moses burnt  
the Golden  
Calf to pow-  
der; A thing  
not to be per-  
formed in  
these days,  
without the  
help of Chy-  
mistry.

lest he reprove thee, and thou beest found a Lyar. Any man else who had considered how the thoughts of God are not as our thoughts; or have imagined that God took notice of those *Vulgar Arts*, out of a Value he placed on them, whereas he no where shews such an esteem for them, nor takes notice of more important discoveries, which happened within the compass of *Moses's writing*, and might have merited his regard, as well as these. He takes no notice who first discovered *Minerals*; whose Inventions were *Gold and Silvers*, and *precious stones*; whose project it was to make *Linnen*, and *Silks*, and the like. If these *Vulgar Arts* deserved his sacred Remembrance, as they were *Arts*, it is certain then that all *Arts* deserved his Remembrance, and he would have been Just unto them. I suppose him to have forgot his *Logick*, and therefore needs to have that old rule suggested to him, *A quatenus ad De omni valet consequentia*. But let us leave this Secret unto him to whom it appertains.

I desire to know by what right he calls those *Inventors* of the said *Vulgar Arts*, by the Title of *Monarchs*? Surely they were not such: for neither *paternal right*, nor *Primo-geniture* (if they create any *Sovereignty*, as I am confident they do not) could intervene here so as to justify him: for *Adam* lived to see *Lamech*, which was the *ninth Generation*; where then could be their *Monarchy*? or, who were their *Subjects*? Can any man imagine that *Abel* was ever a *Monarch*? or that *Cain*, at the time when he tilled the Ground (as his Brother kept *Sheep*) was capable of such a Title? or, that *Jabal*, *Jubal* and *Tubal-Cain* were *Monarchs* during the life of old *Lamech* their Father? this is not amongst the things Recorded of them. — “For there is no more said of them (if we believe Mr. Sprats great Reading) than that they lived so many years, and taught their posterity to keep *sheep*, &c. But is this all that is recorded of them? Dare you avow the saying *in verbo Sacerdotis*? Is the History of the Creation, of *Paradise*, the fall of man, the punishments of his sin, the promise of a *Messiah*, the acceptableness of *Piety*, the odiousness of *impiety*, specified in the accounts of *Cain and Abel*, together with the examples of *God's Vengeance* pursuing sinners in this life, and the terrors of a guilty Conscience;



*Conscience*; Is the History of *Enoch's walking with God*, and his Translation; the Relation of the wickedness of the world, and of the Deluge ensuing thereupon; the severe prohibition of Murder; the preservation of Noah; the Sacrifice he offered at his coming forth; God's promise thereupon; His Covenant with Noah: Are all these insignificant passages not worth the regard, not so considerable as that Noah (subsequent to all these) planted a Vineyard? whereas he saith, there is no mention of their Wars or their Victories; How can he reconcile this with the Battle of those two mighty Monarchs Cain and Abel, in the which the one was slain, the other remained Victorious? Did not that puissant Prince Lamech kill a man to his wounding? But, above all, who could have imagined that a Virtuoso of this age should not have taken special notice of that part of the all which is recorded of those Monarchs, that relates to Lamech his having two wives? and that the rest begat Sons and Daughters most of them? As to the Discoverers of those useful Arts recorded in Scripture; it is usually observed by Divines upon the place, that the greatest Inventors, and the most ingenious at Experimental Philosophy, were the brood of Cain; and to pretend with so much ado to be the imitators of that wicked progeny, puts me in mind of a sort of Heretiques in Epiphanius, who derived their pedigree from Cain, and claimed Kin with Core, Dathan, and Abiram. Thus the Teufels a Family in Alman, are said to give as the Arms of their House, a Devil Gules, in a Field Or. The conclusion of that Chapter in which God is pleased to Record those authors of Natural Discoveries, is very remarkable, intimating as if the rise of Experimental Philosophy, were the Ruine of Piety, and that whiles men were so busie about Earthly concerns they had forgot to worship God. Then began men to call upon the Name of the Lord. Which words admit of various Expositions, but such as all carry a reflexion upon the Inventors. Some read it to this purpose; Then profaneness began in calling on the Name of Jehovah. With which accords the Chaldee Paraphrase, Then the Sons of man left off praying (or, became profane, so that they prayed not) in the Name of the Lord. Others Expound it thus; that

Gen. c. 4 26

See Aylmer's upon the place.

when

when the Holy Seed *Enoch, Mathuselah, Noah, &c.* saw impiety to encrease, and that men laid aside all fear and worship of God, to prosecute *Inventions* delightful and profitable, they began to be troubled, and to call upon God in a peculiar manner, and to preach *Repentance*. A third party thus senseth it, that when the Sons of *Cain* busied themselves in the discoveries of *Nature*, and the divertisements of *Luxury*, and were called perhaps, the *ingenious*, and the *Curieuse*, the *Saints* and Holy race did not seek to be denominated from their *Carvings* or their *Musique*; but the fear of the Lord, which is the beginning of all solid *Wisdom*: and by their calling upon the Name of *Jehovah* were contra-distinguished from those *Experimentators*. Had I been as Mr. *Sprat*; I would have declined this part of the *Rhetorical Address*, by reason of this severe reflexion, which he must needs see was obvious to every Adversary.

“ And if they deserved a *Sacred Remembrance* for one *Natural* or *Mechanical Invention*, your Majesty will certainly obtain *Immortal Fame* for having Established a perpetual Succession of *Inventors*. — In the first place Mr. *Sprat*, I am to seek, How these persons could by their *Inventions* deserve at the hands of God? What *Doctrine of Merit* is this you would introduce? Is not the *Plowing* of the wicked, Sin? Are not the best of men to ask pardon for the defaults that attend their best actions? Is it not true, *Deus coronat in nobis sua opera*? What have we that we have not received? Where then is any desert or boasting? In the *Antapodosis* of this Period, I expected an inference, that God Almighty would have sent some new *Prophet* or Holy Pen-man to Record the *Natural* and *Mechanical Inventions* of this Age, to perpetuate their *Glory*, and the Establishing of the Succession of *Inventors*: But he promiseth no such thing: only he assures the King of *Immortal Fame* for Establishing this Society of *Inventors*: whether they invent any thing material or no.

When I consider the *Falshood* of their *Natural Relations*, the many untruths which He and Mr. *Glanvil* and other *Virtuosi* obtrude upon us, as to the *Antient Writers* and their *Ignorance*; and as to *Modern Writers* and their *Discoveries*; I fear the



the Fame his Majesty will acquire hereafter will be, that He ( out of his *sincere* and *Generous Intentions* to advance the Knowledge and Honour and Welfare of his people ) Establish- ed a *Society* of such *Experimental Philosophers* and *Inventors* ( I believe and hope it will not last to a Succession ) that he will become for ever an *Instance* and *Example* how much the Goodness and *Ingenuity* of a Prince may be abused, and the most specious pretences accommodated to *mean designs*. But what *Posterity* will think of us, how much their estimate for these *Studies* may vary, I know not. I know that a few years have changed Extremely the *Sentiments* of this Age, & the *Opinion* of *Honorable, Judicious, and Sober* persons (such as are and were Members of the *Royal Society*) is very different now from what it hath been : and that *Antient Poet Virgil* hath more abettors than *Pindarical Mr. Sprat*, since he prefers those studies which instruct men in the *Arts of Government*, that is, that *Learning* which our *Universities* intend, before the *Mechanical Education* of the *Virtuosi*.

*Excudent alii spirantia mollius aera,  
Credo equidem, viros ducent de marmore vultus,  
Orabunt causas melius, cœlique meatus  
Describant radio, & surgentia sidera dicent.  
Tu regere imperio populos, Romane, memento ;  
( Hæ tibi erunt artes ) pacisque imponere morem,  
Parsere subjectis & debellare superbos.*

Virg. *Æneid*.  
lib. 6.

Others, I grant, shall mould respiring Brass,  
And grave on Marble a more lively Face ;  
Some better plead ; and some Astronomers  
Better describe Heavens motion, and the Stars :  
Be thou ambitious how to Govern best,  
In these Arts *Roman*, thou must be profest,

Mr. Ogleby's  
Translation,

b

That

That we a Peace well-grounded may enjoy,  
Subjects to spare, and Rebels to destroy.

“ While the *Bishops of Rome*, did assume an *Infallibili-*  
 “ *ty*, and a *Sovereign Dominion* over our *Faith* : the *Re-*  
 “ *formed Churches* did not only justly refuse to grant them  
 “ that, but some of them thought themselves obliged to  
 “ forbear all *Communion* with them, and would not give  
 “ them that respect which possibly might belong unto so  
 “ *Ancient* and so *Famous* a *Church* : and which might still  
 “ have been allowed it, without any danger of *Super-*  
 “ *stition*. — Having represented to the *World* how  
 little *Mr. Sprat* is versed in *Grammar-Learning*, and the *Bi-*  
 ble : Here he gives me an occasion to shew his *Ignorance*  
 in *Church History*. It is false and notoriously known to be so,  
 by any man that is conversant in the *Writings* of our  
*Divines* against the *Papists*, that the *Grand Motive* and  
*Reason* why the *Reformed Churches* did Separate from the  
*Bishops of Rome*, was because they assumed an *Infallibility* and  
*Sovereign Dominion* over our *Faith*. Had the *Popes* taught  
 the sincere *Truths* of the *Gospel*, had they not depraved  
 them with heathenish and *Superstitious Follies*, *Blasphemies*,  
 and *Idolatry*, the Point of *Infallibility* had never come into  
 Question amongst those who were in possession of *Truth* and  
*Peace* : but when the gross *Usurpations*, *Errors*, and *Damna-*  
*ble Blasphemies* and *Idolatries* of the *See of Rome* came into  
 Dispute, and to be refuted by the means of that *Critical*  
*Learning* and *Philosophy* ( assisted by the peculiar *Grace* and  
 concurrence of *God* ) which our *Virtuosi* deny ; then was  
 this Question started about the *Infallibility* of the *Roman*  
*Catholick Church*, whether that could Erre ? That the  
*Bishops of Rome* either are *Infallible*, or have any *Sovereign*  
*Dominion* over our *Faith*, was no Question on which Pro-  
 testancy



restancy was introduced and *Communion* with *Papists* refused. The *Papists* themselves did avow it: they held that the *Church Catholick* could not Erre, and that *they*, that is the *Christians* in *Communion* with them were the *Church Catholick*. If the *Popes* *Infallibility* came to be asserted, it was by the *Canonists* (impious and indeed *Blasphemous Parasites*) *Sic omnes Apostolica sedis Sanctiones accipiendæ sunt, tanquam ipsius Divini Petri voce firmata sint.* So saies *Gratian. Distinct: 19. Canon: 2.* But the *General Counsels* of *Pisa*, *Constance* and *Basil* have sufficiently damn'd this *Doctrine*. *Leo* the Tenth in the *Lateran* Counsel said indeed, that none of his *Predecessors* had erred (but he evidently erred in saying so) yet he neither did nor durst say *they were infallible*. The *Jesuites* of late do (I confess) assert the *Popes* *infallibility*, but I well know the *Sorbon* and the (a) *Parliament* of *Paris*, and the (b) *French King* too have lately damn'd this *Doctrine* (of the *Popes* sworn *Janizaries*.) Nay so ridiculous is this assertion of theirs, that they neither tell us, nor know themselves, how he is infallible: whether by himself, or with his *Consistory* of *Cardinals* or a *General Counsel*? and then, what is a true *General Counsel*? who must call it? who have decisive *Votes*? and whether all or the *Major part* may be enough to make a *Canon*? Concerning these (and many such *Questions* more) they are not agreed, and so cannot assure us of what they are not assured themselves. If any *Pope* ever did assume a *personal infallibility*, and *Soveraignty* in matters of *Faith*, any man might have rejected the bold *Assertor* without being an *Heretick*, or being guilty of *Apostasy* from the *Roman-Catholick Church*, for the *Gallican Church* keep *Communion*, and yet ever denied the *Popes* *infallibility*. In fine, the *Point of Infallibility* of the *Roman Catholick Church* (I am not such a Fool as to say the *Infallibility* of the *Bishops* of *Rome*, for they are confessed to have Erred and that damnably some times) was not the occasion of the rupture betwixt the *Papists* and the *Protestants* at first; nor doth it now continue it otherwise then by accident, in as much as it hinders the *Reformation* of those

(a) Arrest de la Cour de Parlement portant que les propositions contenues en la Declaration de la Faculte de Theologie de Paris. &c. Da. 30. May. 1663.

(b) Declaration du Roy pour l'Enregistrement des six propositions de la Faculté de Sorbonne, &c. A Paris. 4. d'Aoust 1663.

*Idolatrous Tenets* and practises with which that man of *Sin* hath filled his adherents, and without the profession whereof no *Protestant* can be admitted to their Church-membership and Communion. Let any man but comply with them in these Solemnities, and I dare engage that he shall never be pressed *Authoritatively* to own that personal *Infallibility* of the Pope or his Sovereign Dominion in matters of Faith: So that there must be more Important grounds than Mr. Sprat intimates for that great Action of the Reformed Churches; or the imputation of *Malepertness* and horrid *Schisme* must be fixed on them: But the Truth is, they were *infallibly* certain *Certitudine fidei*, as assured as they were of the Truth of the Bible, and Gods word; and as Morally certain as *Metaphysicks*, natural (That is *Aristotelian*) Philosophy, and Skill of Tongues could make them, that the *Papists* did hold such Errors, as none could know, and Communicate with, without hazard of damnation; Nor any Ignorantly profess and be saved, without the benefit of an hearty though General repentance, and the boundless (but not to be presumed upon) Effects of that mercy of God in Christ, which the *Antichristianisme* of that *Satanicall Synagogue* otherwise would frustrate. 'Tis not disputed betwixt Church and Church whether the Pope can add new Articles of Faith, or vary the old Creed: the current of *Popish* writers ascribe unto him no such Dominion over our Faith, no nor to their Counsels. They are to enquire *Quid traditum est?* What there is of Ecclesiasticall Tradition in the Scripture and the Church Doctrine and Practise, and to determine this or that to be *de fide*, because it hath alwaies been *de fide*: Every Point that comes short of this declaration, is so farr short of its *Catholicisme*, and the Obligation to believe it. And now let any man Judge whether Mr. Sprat were of the number of those that were Satiated (to use his own expression pag. 152) with Religious disputes, or of those that never looked into them; how necessary soever they be to the support of the *English Monarchy*, the Church, of which he is a Member, & the Salvation of his Soul, which is of more importance, then these *Natural Experiments*. I could have with

*Nec modus ul-  
lus esse debet  
investi gandi  
veri: Et qua-  
rendi turpis de-  
fatigatio, cum  
id ipsum quod  
quaeritur sit pul-  
cherrimum.*



with more confidence cryed out, *How beautiful are his Feet and Hands*, had I found him employed in the *Gospel-work*, than in this *Society*. But he gives me no cause for this Exclamation: that which follows is of so pernicious consequence. — “Some of the *Reformed Churches* thought themselves obliged to forbear all communion with them, and would not give them that respect which possibly might belong to so *Antient & so Famous a Church*. — I am much to seek which of those that wear the name of *Reformed Churches* did ever hold it lawfull to hold Communion with the *Bishops of Rome*, and their adherents. For since the Question is not concerning *Civil Commerce and Actions of General humanity*, but concerning *Church-worship*, and joyning with them in the *Sacrifice, Prayers, and Ceremonies of their most superstitious Mass* (to be present at and bear a part in the Service, and to receive the Sacrament are with them, as with the *Church of England*, tokens of the *Church-Communion*, and not the hearing of *Sermons*) and at other times owning them as a *Church of Christ*: Since this is the Question, I would willingly learn of our *Historians*, which of the *Reformed Churches* hath not forborn all Communion with them and taught it to be necessary to do so? It is true the *Church of England* hath upon very easy termes made way for the *Papist* to come to us, to communicate with us: The *Hierarchy*, the *ceremonies* retained, the very *Liturgy* word for word being so framed, that whatever they hear or see at our Service is not repugnant to what their Church followeth; as *Mr. Hailes* in one of his Sermons doth shew: And indeed they differ no more than a *Bible* with the *Apocrypha* from one which wants it. And this in great part is the foundation of our *Penal Lawes* against the *Papists*, because they do refuse to come to hear and assist in the same *Prayers and service* which their Church useth, or only condemn because it is not of the *Pontifical approbation*. If the *Papists*

Though Mr. Spat teach us in this History that 'tis unci- vil to condemn the Religion of other Countries: Yet the Apo- stles were not bred up to that civility.

Mr. Chillingworth teacheth, that it is impossible for any to hold

*External Communion* with the *Church of Rome* and not to *Communicate* with her Errors: and declares he never met with any *Protestants* that held it lawfull, but he lived not to see our *Inventors* nor this *History*.

1 Cor: cap. 10.  
ver. 20, 21.  
1 Cor: cap. 6.  
ver. 15, 16.

should comply in the manner demanded with the Church of England, it might then be said indeed that they Communicated with us; But not that we held Communion with them, except we likewise resorted to Mass, joyned with them in their prayers, and participated there; which is a thing our Homilies, the Articles of our Church, nor (I think) any of our Church-men ever taught, nor could it be done without danger of strengthening them in their Superstitious and Idolatrous waies, and the hazarding of the whole interest of the Kingdome of Christ as it is lodged in the Protestants, they being apt thereby to be ensnared, and from a mixing Fellowship with God and Belial come at last to fall into Popish Idolatry.

Certainly neither the Antiquity nor the Fame ( Arguments so powerful with Mr. Sprat, but so ridiculous, so extrinsecal to truth, and Baffled by all Protestant Divines! ) can warrant this procedure. This the Papists are aware of, who shew no such regard to the Ancient and Famous Church of England. And it is evident that Errors are not the more tolerable, but the more dangerous for being Ancient. Could antiquity or Fame give Credit to impious Communion or Civilities, how ought we to Reverence that old Serpent, whose Antiquity, whose renown, whose extent of Dominion is such, that all which Mr. Sprat so much admires, and Pleads for, is but a part of it. Mr. Sprat, Mr. Sprat let me tell you and some of your fellow-Virtuosi, that there is a tenderness for those without which is Cruelty to those within: and that you must have a care how you destroy those who profess the Gospel and for whom Christ dyed, to gratify such as live in opposition to him in all the Offices of his Mediatorship, & to whom he will say at the last day, I know you not, be gone you workers of iniquity. But I shew too much of the Divine, whilst our Historian shews so little: but I could not dispense with this Passage: and I wonder how it ever could be permitted in such a piece: lest it should be thought to be the Judgement of that Illustrious Society, and that they were making way for the Introducing of something else besides



besides a *New Philosophy*. It is a Caution which the *Apostle* Suggests unto me, Take heed lest by any means this liberty of yours become a *Stumbling block* to them that are weak. For if any man see thee which hath knowledge, sit at meat in the *Idols Temple*: shall not the *Conscience* of him that is weak, be emboldned to eat those things which are offered to *Idols*? And through thy knowledge shall thy weak brother Perish, for whom *Christ* dyed? But when ye sin so against the brethren and wound their weak *Conscience*, ye sin against *Christ*, *1 Cor: cap. 8. ver. 9, 10, 11, 12.*

“I can only apply my self to that good Nature, which  
 “a Great Man has observ’d to be so peculiar to our Na-  
 “tion, that there is scarce an Expression to signify it in  
 “any other Language. — This Notion about Good Na-  
 “ture hath so delighted Mr. Sprat that in his Discourse  
 against Mr. Sorbier, he thought fit to propose it to the  
 world, and here to repeat it again. In that Discourse he  
 makes this Observation to be an Instance of the pro-  
 found Criticisme of the Earl of Clarendon But cer-  
 tainly never was a great Minister of State so abused by  
 an ill defence as that Honorable person was, when such  
 poor things were alledged in his Commendation, he seem-  
 ed more depreciated by his Apologist, than by his Adver-  
 sary. I am apt to believe that the Great-man (yet whose Great-  
 ness, did scarce surpasse that of Sir, Tho. Moore, or the Lord  
 Bacon, to whom Mr. Sprat compares him) had other Ex-  
 cellencies then a Criticall knowledge of Ancient or Modern  
 “Languages. But Mr. Sprat saies this of him — There  
 “is Scarce any Language in the world, which can pro-  
 “perly signify one English expression, and that is Good-  
 “Nature. Though Monsieur Sorbier will not allow the  
 “Noble Author of this Note to have any Skill in Grammar  
 “learning, yet He must pardon me, if I still believe the ob-  
 “servation to be true. — I know not how kind Monsieur  
 Sorbier may be unto him, and how he may practice a quali-  
 ty which is so hard to be Expressed: But I am sure, I cannot  
 indulge him in this Conceit: for if the French do not signify  
 the same by *un homme de bonne Nature et homme d’un bon*

H. ft. of the  
 R. S. Pag. 61.

*naturel*: I am sure that one shall find that the *Greeks* do equal the Emphasis of our *English* in that of *Ευθυς*, and transcend it in the word *καλονειαθ*. What other Languages may do, it is for Mr. *Sprat*, and others to determine, without understanding them; I care not to render at present such testimony of my folly.

If any be not  
so good a Gre-  
cian as to be

convinced of the Signification of *Ευθυς* let him but read what *Hen. Stephani* in his *Thesaurus Ling. Græc.* saith of it and he will no longer doubt.

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Mistakes

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## Mistakes about the SWEATING-SICKNES, and its Cure.

**T**O shew the great Utility of the *Royal Society*, he says "They will be able by degrees to purchase such *Extraordinary Inventions*, which are now close lock'd up in *Cabinets*; and then to bring them unto one Common Stock, which shall be upon all occasions expos'd to all mens use. This is a most *Heroick Invention*; For by such concealments, there may come very much hurt to mankind. If any certain remedy should be found out against an *Epidemicall* disease, if it were suffer'd to be engross'd by one man, there would be great Swarms swept away, which otherwise might be easily sav'd. I shall instance in the *Sweating-Sickness*. The Medicine for it was almost *Infallible*: But, before that could be generally published, it had almost dispeopled whole Towns. If the same disease should have returned, it might again have been as destructive, had not the Lord Bacon taken care to set down the particular course of Physick for it in his History of Henry the *Seventh*, and so put it beyond the possibility of any private man's invading it. This ought to be imitated in all other Sovereign Cures of the like nature to avoid such dreadful casualties.

One would think by the words of our Historian, That the Cure of the *Sweating-Sickness*, were recorded by no Body but the Lord Bacon that it was almost *Infallible*; that the *Sweating-Sickness* did not return again; And that the Cure was rather concealed (and needed to be generally published) at first, then to be discovered by *Observation* and *Experiments* of those that first fell sick. But there is no such thing: for the same cure is related by *Polydore Virgil*, and *Holinshed* in their Histories of Henry the *Seventh*. And the same sickness did rage in the twenty second year of the said King his Reign, as well as the first. And the Cure related was so far from being almost *Infallible*, that my Lord

Bacon only saies it commonly recovered the sick : and after it was so generally known, yet the twenty second year of that Kings Reign, many dyed of it ( as *Holinshed* saith ) howbeit not in the same number, by reason of the remedy found out at the beginning of it. To convince the Reader of the truth of what I say, and to shew how unacquainted this *Virtuoso* is in our *English Chronicles*, I shall set down the words of the Lord Bacon, of *Holinshed*, and of *Polydore Virgil*.

Lord Bacon Hist: of H. 7. pag. 9.

“ It appeared by *Experience*, that this disease was rather  
 “ a surprile of nature, then obstinate to remedies, if it  
 “ were in time looked unto. For, if the patient were kept  
 “ in an equal temper, both for clothes, fire, and drink,  
 “ moderately warme, with temperate Cordials, whereby  
 “ natures work were neither irritated by *Heat*, nor turned  
 “ back by *Cold*, he commonly recovered. But infinite persons  
 “ dyed suddenly of it, before the manner of the Cure, and atten-  
 “ dance was known.

*Holinshed* Hist: of H. 7. in the beginning.

“ At length by the diligent observation of those that es-  
 “ caped ( which marking what things had done them good, and  
 “ holpen to their deliverance, used the like again. When they  
 “ fell into the same disease a second or third time, as to divers  
 “ it chanced ) a remedy was found for that mortall Mala-  
 “ dy, which was this. If a man on the day time were taken  
 “ with the *Sweat*, then he should Streight lye down with all  
 “ his clothes and Garments, and continue in his Sweat  
 “ twenty four houres, after so moderate a sort as might be.  
 “ If in the night he chanced to be taken, then should he not  
 “ rise out of his bed for the space of twenty four houres,  
 “ so casting the cloths that he might in no wise provoke  
 “ the Sweat, but lye so temperatly that the water might  
 “ distill out softly of the ovvn accord, and to abstain from  
 “ all meat, if he might so long suffer hunger, and to take no  
 more



" more drink (neither hot, nor cold) then would mode-  
 " ratly quench and assuage his thirsty appetite: Thus  
 " with luke-warm drink, temperate heat, and measurable  
 " clothes *many Escaped*, Few which used this order (after  
 " it was found out) dyed of the Sweat: marry, one point  
 " diligently above all other in this Cure is to be observed,  
 " that *he never did put his hands or Feet out of the bed to refresh*  
 " or cool himself, which to do is no less jeopardy than  
 " death.

Polydor. Virgil. *Hist.* l. 26. *Henrici Septimi:*

Eodem anno novum morbi genus pervasit totum regnum, sub  
 primum Henrici in insulam descensum, dira quidem lues, &  
 quam nulla sit etas antea, quod constet, perpeffa: subito enim su-  
 dor mortifer corpus tentabat, ac simul dolor caput Stomachum-  
 que vehementi caloris ardore affectum angebat. Quo in mor-  
 bo homines qui a principio erant, quia alii aestus minus patien-  
 tes, si in lecto erant, Stragula dimovebant, si vestiti, vestes de-  
 ponebant; alii sitientes frigidum potum sumebant; alii demum  
 patientes caloris fœtorisq; nam sudor grave olebat, additis fra-  
 gulis, sudorem provocabant, æquè omnes aut illico, aut non multo  
 postquam sudare cœpissent, moriebantur, ita, ut ex omni agro-  
 tantum numero, vix centesimus quisque evaderet. Neque  
 ulla interim medicorum ars aut scientia quicquam opitulabatur,  
 quin morbi novitas omnem illorum excluderet peritiam. Verùm  
 post viginti quatuor horas (tanto temporis Spacio vis ejus  
 morbi durabat) abeunte sudore, nonnulli confirmabantur: non  
 eo tamen ita expurgati erant, quin iterum atq; iterum in  
 morbum reciderent, multiq; inde perirent. Sed ea res reme-  
 dium tanto malo ad ultimum monstravit: nam qui semel primo  
 sudarant, cum deinde rursus agrotarent, observabant ea quæ  
 in primâ curatione, profuissent, et illis pro remedio utentes,  
 addebant semper aliquid ad curationem utile. Item et illi iidem  
 cum iterum in idem valetudinis genus inciderent, ex priore  
 observatione earum rerum, per quas se confirmassent, ita se cu-  
 rare didicerunt, ut vim sudoris illius facile tolerarent. Quibus  
 rebus ita usu venit, ut post ingentem mortalium stragem reme-  
 dium

"dium unicuique promptissimum inventum sit, quod huiusmodi est;  
 "Siquis interdiu sudore corripitur, cum vestitu protinus cubatum  
 "eat: sin noctu, et in lecto, tum quiescat, nec se à loco moveat, usque  
 "ad viginti quatuor horas exactas: interim ita se stragulis oneret,  
 "quo non provocetur Sudor, sed sua sponte molliter stillet, cibi ni-  
 "hil capiat, si tam diu famem tolerare possit, neque plus potionis  
 "consuetæ ac calefactæ hauriat, quam modicè satis sit ad sitim ex-  
 "tinguendam; inter hanc curationem inprimis caveat, ne manum  
 "quidem aut pedem sui refrigerandi, recreandique causâ, extra  
 "stragula proferat, quod facere letale est. Hoc remedium est  
 "novo morbo inventum, qui tantum Angliam id temporis per-  
 "vasit et posthac sæpè graviter afflicxit.

Those of the R. S. that understand no more than Eng-  
 lish may compare the account of *Hollinsbed* (or *Hall* in his  
*Chronicles*) with that of the Lord *Bacon*; the more learned  
 may consult *Polydore Virgil*, and if they please *Fracastrorius*  
*de contag.* l. 2. c. 5. *Pareus de pest.* l. 25. c. 5. *Hollerius de mor-*  
*bis intern.* l. 2. c. de sudore. *Langius Ep.* l. 1. Ep. 19. *Beverovicus*  
*de. med. veter.* part. 3. c. 3. pag: 222. *Tho. Cogan* haven of  
 health. pag: 272. & *Senertus de Febrib.* l. 4. c. 15. All of them  
 will be presently satisfied how little the Physicians are be-  
 holden to the Lord *Bacon*, as if he alone had recorded that  
 Cure, which so many besides have committed to writing.  
 Nay it will appear that the account he delivers of that  
 Cure is very imperfect, and such as none but some such  
 inconsiderate *Virtuoso*, would have acquiesced in,  
 much less have recommended. For whereas the others  
 direct that the sick party if dressed in his cloaths, should im-  
 mediately lye downe, without so much as adventuring to  
 put off his cloaths: This Circumstance, of how great im-  
 portance soever is totally omitted: and I think that great  
 caution of putting the Hand or Foot, or any part of the body  
 out of bed, or into any cool place (which they all so severely  
 inculcate) is not sufficiently intimated in that expression,  
 of keeping themselves in an equal temper, both for clothes  
 and fire. And whereas they say the Patient, must refrain  
 from all meats, if possible, for 24 hours, which leaves the  
 party at liberty, to comply with the vital indication, in  
 case

They were  
 not to sleep du-  
 ring the twenty  
 four hours, as  
*Tho. Cogan* ob-  
 serves in the  
 place aforeci-  
 ted: and so  
 doth *Caius*.



case of extremity, otherwise not; of this our renowned Lord makes no mention, nor that the same person might have it twice, or thrice; which is a material observation; nor mentions he the stench of the Sweat, and other Symptoms.

Some having had it twice, died the third time of it, as Cogan relates.

But concerning the *Nature* and times of the *encrease*, *State* and *decrease* of the *disease*: and the manner of feeding, and giving drink to the sick (they gave them *Beer*, *Ale*, *Wine*, as well as other *Juleps*) according to several exigencies and occasions (upon the observation whereof depended their *recovery*) it would be too long to transcribe the passages in *Caius*; and yet without the knowledge thereof this almost *Infallible medicine* would signifie nothing, or as little as we see good *medicaments* now do, when they fall into the Hands of a little dabler in *Physick*, who boasts himself a *Virtuoso*, or an admirer of them. But in those daies when *Caius* himself attended, and more *particular directions* were published in English for the instruction of the people, yet an infinite number of *Rich* (most of them) and *poor* were swept away. *Quoquò te vertisses, cadaver conspexisses. Continuus undiq; nolarum anearum pulsus, confusus sonus erat.* So *Caius*. Whose Book I do recommend to all inquisitive persons, as containing several *Curious* as well as *necessary* observations: nor will I doubt to say that if all that ever my Lord *Bacon* writ, were put into the Scales, (and the *History of the R. S.* and all their discoveries cast in) that single treasure of *Caius* for *Utility* would out-weigh them all, and deserves to be secured from Oblivion by *publick Authority*, least what afflicted this Nation so miserably at sundry times for fifty years space, should returne again, and produce as direfull effects as ever.

When I reflect upon this *remedy* as it is recommended to our admiration, and imitation by this *Historian*, methinks I begin to doubt that those persons will hardly be *punctual* in their own *Relations*, who have the confidence to obtrude upon us such an imperfect one from another. I question not but we are more secured by *Holinshed's* having set it down, than by its being inserted into the *History of the Lord*

*Bacon*, the works of the former will be so much more valued then the latter by our Nation, as long as they have any Judgment. The truth is the Lord *Bacon* is like great piles, when the Sun is not high, they cast an extraordinary shadow over the Earth, which lesseneth as the Sun grows vertical. In the account of the *Sweating-Sickness*, what understanding Physician can read without laughter the Character he gives of the disease. *It was a pestilent Fever, but (as it seems) not seated in the veins or humors, for that there followed, no Carbuncle, no purple or livid Spots, or the like, the masse of the body not being tainted: only a maligne vapour flew to the Heart, and seized the vital Spirits, which stirred nature to strive to send it forth by an extream Sweat.* But *Polydore Virgil* and *Holinshead* prudently decline the controversy about the nature of a *Pestilential Fever*, and only tell us that *A deadly burning Sweat so assailed their bodies, and distemper'd their blood with a most ardent heat (they being sick in head and stomach) that scarce one amongst a hundred that sickned did escape with life.* He that tells me the disease is a *Pestilent Fever*, and the Sweat is an effect of nature endeavouring to expell the Malignity: puts me upon some thoughts that I should not have, if I took the Sweating to be the primary disease, or a Symptome consequential to its Malignity. And whereas our Lord saith *Nature did strive to send forth its virulency by an extream Sweat*: I find not any such thing, for all that recovered were recovered by the continuance of a moderate Sweat: This experience and observation taught them; and the Physicians, imitating those operations of nature, did advise them unto it. All *Extream Sweats* either Spontaneously happening, or procured by Art, were Mortall. As to the Seat of the *pestilential venome*, it seemed not to that Lord to be in the Masse of blood and humors, but only in the vital Spirits. And why? because there followed no Carbuncle, no purple or livid Spots or the like. Is it then necessary that whensoever there is a *Pestilential Fever*, which affects the Masse of blood, that then there must be some cutaneous eruption, by botch, Carbuncle or Spots? No Physician will say it. *Nonnunquam evenit*



evenit, ut in febre manifeste Pestilenti, ac fortè cæteris maligniore, neque papulæ, neq; tumores, neq; ulla naturæ depulsiō conspicia Massarius de febr. c. 24. But that the Seat of this disease was Principally or solely to be placed in the Masse of blood and humors appears, first from the occasionall external cause of it, a moist season preceding, which multiplyed the like humors in the people; Next it is evident from the Symptoms that attended it, particularly the horrid stench of the Sweat, which issued from them that were sick of it: of which Polydor Virgil takes notice. *Sudor Britannicus est quidem Diarius, quia Spatio viginti quatuor*

*horarum perficitur; ut tamen non ob id sub verâ febre diariâ, quæ ex Spiritibus calefactis et putridis Fiat, collocari potest. Nam referunt Britanni medici, et proximi Belgæ, quod non solum agrotantes sudant, multoq; sudore persundantur, verumetiam quod sudor iste est fetentissimus: ad hæc urina livida*

*apparet, ac valde corrupta, sanguisq; aliâs per vesicam excernitur plurimus, aliâs effluit per nares, quin et per aures, quandoq; etiam per oculos stillat, Ex quibus colligitur putrefactionem esse in ipsis humoribus, alioqui laborantibus solis Spiritibus urina non mutaretur, nec sanguis adeo copiosè efflueret.*

*Septalius de peste l. i. c. 21.* I have have been thus particular about this disease, thereby to take of the repute a little of my Lord Bacon, as he fell in my way, whose steps our Society pretend to tread in; and that so exactly as even to mistake where he did. If any shall reply in behalf of that Lord, that *He was no Physitian*, and that in an History, we are not to expect an accurate relation of any disease and its Cure; I shall willingly allow of the Answer; but I must not allow Mr. Sprat that excuse, who (not owning the prescription to be any where else) remits us to the Lord Bacon for a Cure for the Swearing-Sickness, which is almost Infallible, and the preservation whereof in that book, secures the world from incurring the like hazard again: which it might have done, had the receipt fallen into the hands of some avaricious Doctor of Physick. Because

Ephemera benigna est, Anglica febris maligna et pessima, et symptomata habet horrenda, sudorem perpetuum, lipothymiam, cordis palpitationem pulsus frequentiam, et inæqualitatem: adde quod tanta sudoris copia, tam longa convalescentia in his qui evadunt, humores infectos in ea febre indicant esse. Rodericus a Fonseca method. cur. febr.

here is such adoe about a receipt, and that the *Society* promise us to record many more, (fully as good as this!) I shall inquire into the success of this almost *Infallible Medicine* a little further. That the *Sweating Sickness* did rage again in the twenty second year of the Reign of *Henry* the seventh, I have already shewed out of *Hollinshead*, and of the success that *Method* had in curing it, which was indeed such as might give a reputation unto it, though not so great as our Historian fixeth on it. About nine years after. *An. D. 1517.* in the Reign of *Henry* the eighth, the *Sweating-Sickness* did much infect the Kingdome again: and since it cannot be imagined that in so short a time the people should have forgot a *Medicine*, which they are observed to have remembered twice as long before, let us see what effect this almost *Infallible Cure* produced.

It is observed by *Dr. Caius* who lived and writ during the last *Sweating-Sickness*, that it raged five times in this Nation. First in the year 1485. from the beginning of *August* to the last of *October*. This is the time *Mr. Sprat* relates unto. A second time in 1506. during the Summer. A third time in 1517. from *July* to the middle of *December*. A fourth time in 1528. during all the Summer. A fifth time in 1551. when it lasted above five moneths, beginning in *Shropshire* about *May*.

*Herbert* in *H. 8.*  
*An. Dom.*  
1517.

*Jo. Speed* in  
*Ed. 6. Sect.*  
65.

“Truely the disease (notwithstanding this Course!) was of that malignity, as within the space of three hours it killed! This caused the King to leave London, and adjourning three Termes, 1517. to remove Trinity-Terme, 1518. to Oxford where it yet continued but one day and was adjourned again to Westminster. Nevertheless divers Knights, Gentlemen and Officers of the Kings Court died thereof, as the Lord Clinton, the Lord Grey of Wilton, and others of quality; the Vulgar sort so commonly perishing, as in some towns it took away half the people, in others the third part. The same disease again brake out under *Ed. 6. 1550.* It raged extreemly through the land, wherein died the two Sons of *Charles Brandon*, both of Dukes of *Suffolk*, besides an infinite number of men in their best strength; it followed only English men in Forreign Countries, no other people being infected therewith, whereby they were both feared and shunned in all places where they came.

What *Speed* saith concerning the *Sweating-Sickness*, that it at that time pursued the English abroad, without infecting the Forraigners where they sojourned; this is confirmed



firmed unto us by the learned and accurate Dr. *Caius*, who saith that it pursued ( in the daies of *Ed. 6.* ) the English every where, into *Scotland*, *Holland* and *France*. So that it was in vain for any of them to fly their Country. As to the Forraigners, even the *Scots* were not infected with it though living in England at that time: nor did the disease then spread abroad so as that the diseased English should infect the Nations they fled into, or conversed with. He observes also that in 1529. When the *German* ayre became infected with a peculiar sort of malignity ( which yet did not difference the disease in its Symptoms or Cure ) the same Sickness did seise the *Dutch*, and not the *English*, viz. *Hi nostro aere & contagione non leduntur, sed suo: nos non suis illorum sed nostri inficit.*

It were easy to prosecute this argument further, and to shew the vanity of this almost *Infallible* remedy ( though amplified with all the circumstances any *Physitian*, except Dr. *Caius*, sets down ) especially when it falls into the hands of *Empiricks*, and men of little reading; But I think such labour altogether needless to my present purpose; and it is a *Supererogation* of my kindness to the *Vertuosi*, that I give them this ensuing caution. He that would cure this disease as becomes a *Physitian*, must not rely upon one method alwaies especially in malignant diseases, but attend to the differences of *humane bodies*, different seasons of the years, and other accidents which alter mens bodies; and where *humane* search failes us in the discerning of the *Causes* of that sensible difference that is observed to be in the same disease at sundry times, he must, with *Hypocrates*, have recourse to the *Idiosyncrasy*, in other cases to *Dis-Syncrasies*. Thus in some years the *small Pox* is fatall, notwithstanding the best *Methods*: In other times so gentle, that any Nurse can cure it. Some years the *Plague* and *Pestilentiall Feavers* are cured by *Vomiting*, *bleeding*, *purging*, and *Sweating*; In other years *Vomiting*, *Purging*, *Bleeding*, and *Sweating*, have proved pernicious: I shall Illustrate this out of the two great *Plagues* which happened at *Leyden*, in the *Neatherlands*, one in 1624, the other in 1635. In the *First Plague*, all



that had *botches* behind their Eares, under their Armpits, or in their Groine, upon the applying of a vesicatory in a convenient place, and the botch being suppurated, and the matter evacuated by the adjoining vesicatory, the botches vanished without breaking, the malignity and matter contained in the botch venting it self by that other passage. In the latter Plague, although upon the applying of blisters, the sick amended, and the malignity seemed exhausted, yet did all the botches *suppurate and break*. In the *first* Plague all Women that during their being sick of the Plague, happened either *orderly or accidentally* to have their *Menstrua*, and all that had the Plague, and did *miscarry* there, these generally died: But in the second Plague, it was quite otherwise, many women recovered notwithstanding their *abortion*; and most women escaped that had those *Menstrua*, though it were *Symptomatically*. In the *First* Plague, all that had *purple, livid, or black Spots* dyed, almost. But in the *second*, many escaped who had those *Marks*. This *Henricus Florentius* relates upon his own knowledge in his additaments to *P. Paaw. de peste. c. 2. pag. 47.* and with this passage I shall close up this Animadversion, referring all inquisitive persons to *Forrestus* and *Schenkius* in their observations upon this disease; whose *Cure* is so layed down by them out of *Caius, Tyengius, Vissenacus* and by *Tho. Cogan, by Pareus, Sennertus, Langius, Claudinus, Hollerius, Langham* in his *Garden of health* and others, that any one that is *Master of a General and diffused method of Physick*, acquainted with the *generall rules and cautions* and who by a *variety of reading* is acquainted with the *Multiplicity of malignant and Pestilential Fevers*, and that infinite discrepancy that is observed in them, in their *Types, Beginning, Progress, Event, and Cure*, shall not be at any loss in that disease, should it return again, otherwise then what *human imbecillity* and the intricacy of the *thing* subjects him unto. But his *Method* I doubt will not be almost *Infallible*. But! what is all this to the *Historian*?

Hist. of the R.S.  
Pag. 77.

“It was the fear of being circumvented, that made one of our wisest Kings delay *Columbus* too long, when he came



“ came with the promise of a *new world* : whereas a little  
 “ more confidence in his Art, and a small charge in furnish-  
 “ ing out some few ships would have yearly brought all  
 “ the Silver of the West-Indies to *London*, which now ar-  
 “ rives at *Sevill*,

I do not wonder that our *Historian* hath not read *Holin-  
 shed* and *Polydor Virgil*; but how can he be excused for not  
 being conversant in the Lord *Bacon's History of H. 7.* whose  
 words are these pag. 189. “ It is certain that the *Kings*  
 “ fortune had a Tender of that great *Empire of the West-*  
 “ *Indies*. Neither was it a *refusa'll* on the *Kings* part, but   
 “ a delay *by accident*, that put by so great an *Acquest*. For  
 “ *Christophorus Columbus* refused by the King of *Portugall*  
 “ (who would not embrace at once both *East* and *west*)  
 “ employed his Brother, *Bartholomæus Columbus* unto  
 “ King *Henry* to negotiate for his discovery. And it so  
 “ fortun'd that he was taken by *Pirates* at Sea, by  
 “ which accidentall impediment, he was long ere he came to   
 “ the King; So long that before he had obtained a *Capi-*  
 “ tulation with the King for his Brother, the enterprize by  
 “ him was atchieved, and so the *West-Indies* by *Providence*  
 “ were then reserved, for the Crown of *Castilia*. Yet this  
 “ sharpened the King so, that (not only in the voyage of  
 “ *Sebastian Gabato*, but) again in the Sixteenth and Eight-  
 “ teenth year of his Reign he granted forth new *Com-*  
 “ missions for the discovery and investing of unknown  
 “ Lands.

I do not find by this *History* that the King did suspect *Co-*  
*lumbus* for a Cheat, or put any *delays* upon him because he  
 was not satisfyed with his Art. His Brother having been  
 taken and detained by the *Pirates*, this *Columbus* applyed  
 himself to the King of *Spain*, and had Transacted with him  
 and finished his voyage, and first discoveries, before *Bar-*  
*tholomæus Columbus* could arrive and finish his Capitulation  
 with *H. 7.* But had that prudent King doubted of his  
 Art in a Case not yet tryed, where the *Discovery* seemed as  
 uncertain as were the length and *incommolities* of the  
 voyage : and where the grounds upon which He went,

F

seemed

seemed meerly *conjectural*, how could he be blamed? For whatever private Intelligence *Columbus* had from a *Spanish* Pilot (that dyed in his house) or otherwise, *he* (being more desirous to make his Enterprize the *Child* of his *Science* and *Fortune*, then the follower of a former discovery) represented no other assurances that all was not Sea from the West of *Europe* and *Africk* unto *Asia* but *Seneca's* prophecy, or *Plato's* antiquity, or the nature of *Tides* and *Land-winds* and the like. The Lord *Bacon* terms them only *Conjectures*, and these *Gentlemen* who hold that in those daies there was no Philosophy about the *Winds* and *Tides* whereupon one would rely, and those antiquities of *Seneca* and *Plato*, being but the dotages of two *Fooles* credulous and apt to conclude too soon, should not condemn the deliberate procedure of that King. Especially since the discovery of the *North-west* though grounded upon better *conjectures* (as my Lord *Bacon* saith) then those of *Columbus*, proved un-effectuall in the voyage of *Sébastian Gabato* whom the King did furnish out with a ship not long after: and so hath the prosecution of the *North-west* passage since that. I think I could evince further out of the condition that *England* was then in, not being so populous as of late years, the *Scots* being un-assured, *France*, *Spain* and the House of *Burgundy* emulating, if not hating him, and the *Fleets* and *Narvall* power of *England* being nothing to what it hath lately risen unto, that (considering our Scituation in comparison of *Spain*) it was not so easy a thing as he imagines, to have possessed the *West-Indies*, and effected that trade and commerce which the *Castilian* is now master of: but I shall not digress so farr.

Animad-



Animadversions upon the *History*  
of making *SALT-PETRE*,  
which was Penned by Mr. *Hen-*  
*shaw*.

**T**His History of *Salt-Petre* hath so many defects in it, Hist. R. S.  
Pag. 260.  
that I wonder any one should offer such an account to them; and am more surprised to see it approved by them and inserted into their History as a Specimen of their Narrations for the world to Judge how accurate and inquisitive the Society, and its Members are. The Narration is not only imperfect; but in many parts false, so that for ought I can discern, the History of Nature which they propose to themselves, will not merit any more Credit (if so much) then that of *Pliny*: and these Experimentall Philosophers instead of undeceiving the age as to inveterate Errors will multiply new ones. We are told in their History with Hist. R. S.  
Pag. 99.  
“ what caution they proceed in their Experiments, in  
“ the making of them, and in the repeating them: they observe all the Chances and the regularities of the proceeding; what nature does willingly, what Constrained; what with its own power, what by the succours of Art; what in a Constant rode, and what with some kind of Sport and extravagance; industriously marking all the various shapes into which it turns it self when it is pursued, and by how many secret passages it at last attains its end; never giving it over till the whole Company has been fully certified of the certainty, & constancy, or on the other side of the absolute impossibility of the effect. This Critical and reiterated Scrutiny of those things which are the plaine object of their Eyes, must needs put out of all reasonable dispute the reality of those operations, which the Society shall positively determine to have succeeded. — Nay, they Pag. 100.  
“ tell us that there is not any one thing which is now approved and practised in the world, that is confirmed by  
“ stronger

"stronger evidence than this which the Society requires ; except only the *Holy Mysteries of our Religion*. Whether he intend to present the *Holy Mysteries of our Religion* as *fabulous and ridiculous* I cannot tell : but whosoever shall reflect upon this *Similitude* and examine the reality of their *Experiments*, and particularly of this concerning *Salt-Petre*, which is a common thing, and the *Instance* of their *care and exactness*, will hardly entertain any kind thoughts of these *Projectors*. Just as I was writing this, Mr. *Bagnall* had his workmen employed about the making *Salt-Petre* at *Warwick* and *Coventry*, whereupon I consulted with the *Operators* and received the subject of these following *Animadversions* from them.

As to that Question which he first proposeth, whether the *Salt-Petre* which we use now, and that of the *Ancients*, be of the same *Species* ? He might have encreased the Catalogue of such as deny it, by adding *Quercetan* in his discourse of *Gunshot-wounds*, and *Brassavolus* in his Treatise of *Purging medicines* : *Joel* in his discourse of *poysons*. As for *Scaliger*, he distinguisheth betwixt *Nitre* and *Salt-Petre*. He saith and proveth it that the *Nitre* of the *Ancients*, is not a thing lost totally, but common to be had in *Asia* and *Egypt* and even in *Tuscany*. And *Poterius* saith, he gathered it in several places about *Bononia*, and particularly in *Monte Paderna*. And if *Langius* be the Author Mr. *Henshaw* cites ( I never heard of any writer called *Longius*, and am apt to believe it to be a mistake of the Printer ) it is plain that he reckons our *Salt-Petre* as a distinct *Species*, and not as the same with that other of the *Ancients*. *Est et alia Nitri Species* ( marke that ! ) *artis industriâ parata, quæ ex stirijs frigore in lapidibus parietum aut testudinum concretis, sensim distillantibus, saxi et cemento accrescit, aut ex putrida et salsuginosa in stabulis terra, veterinariorum urinâ conspersa decoquitur. Novum inventum, veteribus Medicis ignotum.* The distinction that *Scaliger* makes betwixt *Salt-Petre* and the *Nitre* consists in the *tenuity of their parts*, and upon the same ground he distinguisheth *Salt-Petre* from the number of *Salia Fossilia*, or *Salts* digged out of the Earth. *Tantum abest, ut sal petræ sit sal Fossile, ut*

De subtil. ex-  
ercit. 104.  
Sect 15.

Pharmacop.  
Spagyric. l. 1. 7.

Epist. l. 2. Ep.  
32.



et a Sale et a Nitro distet partium tenuitate. Tam enim sal quam <sup>ubi supra.</sup> Nitrum ita uritur, ut cineris quippiam relinquatur. Sal petra univ. sum. absuntur ab igni. What the judgment of Cardan may be, I know not; But untzerus doth give his reasons why our Nitre and theirs should not be of the same Species. Because that theirs was such as might be eaten with meats, and commonly drunk with wines; it was of a rosy colour, bitter, light, Spungy, and of an Earthy Nature. de Sal. c. 18.

Whereas our Salt-Petre hath none of these qualities. As for those that hold the Affirmative, their number is not so great as he represents them to be, nor is the general vote of learned men so favourable to that opinion. But the controversy is laid aside, because we have none of that Nitre brought over unto us. Should it happen once to be so, or that we should meet with any Veins of it or Nitrous Waters in Europe where it were to be digged or made without Lixiviating, it is not to be doubted but there would arise several disputes about the Mineral it self and the bodies, that separate from it upon refining. Since there is a great difference in the Salt-Petre of several grounds in England, and some having a greater proportion of Common Salt than others have, and some abounding much more with Sal Poterius Phar-  
mac. Spagir. l. 1.  
c. 7. Armoniack than others, as the Barbary-Petre, or that which is cast out of the Earth in Italy, or hangs upon old Stone walls in England: whereas that which is made by boiling, participates not at all of the nature of Sal Armoniack. And that many little differences in the Petre besides these, might have been offered to the consideration of the Society, and found out by them in order to the improving of Gunpowder, is certain: but they are not so serious, as they pretend. And whereas Mr. Henshaw saith that the reason why the general vote of learned men hath been most favourable to that opinion of their being but one Species, was "because that in all Latine Relations and, prescriptions, the word Nitrum, or Halinitrum is most commonly used for Salt-Petre. I do not believe any man ever gave that reason: For the word Nitrum is of

The Petre of House-floors and the like which abounds with Common Salt, can never be so refined as to burn, or be so effectual, as that of better Soyl. The common Salt being in part inseparable.

*Avicenna con.  
med. l. 2. tr.  
2. edit. Plem-  
peti p. 71.*

Greekish originally, *νίτρον & λίτρον*. The Greeks and Latines call that peculiar sort of Minerall, *Nitre*, which was in some places digged out of the *Earth*, in others made by the *Sun* operating upon little *Canales* made out of the *Nile*, and oftentimes it was cast up of it self out of the *Earth* (or bred there) in manner of a hoar frost, as it is now in the *Indies*, and *Barbary*; the *Arabians* called it *Baurakh* and mention two sorts, that of *Armenia*, and that of *Africk*. When

I here argue as if our *Salt-Petre* which is Extracted out of *Earth* by *Elixivation*, were unknown to the Ancients. And I confess that notwithstanding what *Tartaglia* and *Semicowicz* say (whose words I shall relate anon) I can not perswade my self but that if they had been acquainted with so strang a *Phenomeon* in nature, they would at one time or other have taken notice of this as well as of other waies of gaining *Nitre*. That none should either directly or casually let fall a word that might convince us that they knew it, is a strong presumption they were ignorant of it: and though there be no records that tell us when or by whom it was invented, yet it is more easy to comprehend how it should be a *moderne discovery*, and yet the Author unknown (a common accident) then how it should have been known so long and yet never spoken of by those who have even in the making of *Salt* and *Nitre* taken notice of as minute circumstances.

the use of *Gun-powder* had rendred *Salt-Petre* so advantageous a commodity, and that modern Artists had found out this way of extracting it out of *Earth* by *Elixivating* it, they gave it the same appellation that the Ancients did to their *Nitre*, and came to use promiscuously the Names of *Nitre* and *Salt-Petre*, both sorts of *Nitre* being equally subservient to their ends, and being in a manner all one after refining; although *Curiosity* might be able to multiply distinctions from the different manner of productions, and different constitutive principles that occur daily in the making *Salt-Petre*. They were the more induced to give our

*Salt-Petre* the same name with the Ancient *Nitre*, because that they had continued the name of *Nitre* to the same sort of *Minerall*, though sometimes occurring in a white colour, sometimes *Black*, sometimes *red*: sometimes they had it naturally produced; sometimes it was artificially generated in their *Pooles* or *Canales*: Sometimes it was of so hard a consistence as not to dissolve easily in water; sometimes it was soft, of a loose texture, and as it were froathy. From this consideration the moderns thought it no incongruity if they gave the same name to their *Salt-Petre*, which the Ancients had given to a *Minerall* of so resembling a nature. So *Bo-tallus* saith. *Quamquam adhuc sub judice lis est, num hoc nostrum Nitrum*



*Nitrum* idem sit quod veterum, sensus tamen indicat hoc facultate illi haud ab simile esse. So *Quercetan* saies, *Salpetra* nostrum a *Nitro* diversum est, nisi quod qualitatum communienem fortè quandam cum illo habet, quemadmodum sales omnes inter se communionem quandam habent. de *vulner. Sclopet. Sect. 10.*

We see in common Salt how great a variety is comprehended under the same appellation. Some is white, some black, some bay, some red, some purple, some digged out of the Earth, some made by the Sun; Some is boild to its consistence; in the tast there is great difference; some more pleasantly Salt than others, some bitter and ill tasted. Some Salt hath a rank smell; some none at all; and in the effects and uses to which Salt is applyed, there is so great a variety and discrepancy that we may justifie our calling the Common Salt-Petre by the name of *Nitre*. In the mean while it is apparent that the Latines could not use the word *Nitrum* or *Halinitrum* for that Salt-Petre which we commonly make; and they must be very ignorant persons that could avow our Salt-Petre and the *Nitre* of the Ancients to be of the same Species, because that in all Latine Relations and prescriptions the word *Nitrum* or *Halinitrum* is commonly used for (ours? or another kind?) Salt-Petre. If ever they had any such it was called *Aphronitrum* et *Spuma Nitri*: and not *Nitrum*. vide Laurenbergium in aphor. Sal. c. 18.

But however Mr. *Henshaw* hath done less then one would have expected in the foregoing discourse; he would have done more than I, or any other, towards the determining the Question concerning Salt-Petre, whether it were the same or no, with that which the Ancients used and called *Nitre*. Let us listen to our *Vertuoso*, and marke how much the Members of the *Royal Society* surpass all others of the number of *Literati*. "If, saies he, I could have got any Egyptian *Nitre* at the Drugsters, I doubt not but I should have been able to have put an end to that Question; by a Demonstration, that is by turning the greatest part of it into Salt-Petre. Here I must first inform our *Experimentall Philosopher*, that the Ancients had more sorts of *Nitre* besides that of Egypt, as the *Armenian*, *African*, *Roman*, *Babylonian* Hist. of the R.S. Pag. 261.

and *Macedonian*; and as to that of Egypt, perhaps besides that *fouleness* which is likely to adhere unto it by reason of the muddiness of the Nile, there might be so much of *common Salt* in it, as would render that part of his assertion false, wherein he seemes not to doubt but to turn the greatest part of it into *Salt-Petre*. His own Citation out of *Pliny* (pag. 263) evidenceth that the *Nitre* of Egypt was the worst, and most remote from our *Salt-Petre*. And when he should have done all this, Yet would his DEMONSTRATION be ridiculous, and be laughed at by every yong Sophister. I shall shape the Argument for him by which the Question is to be decided.

*Pliny and Kircher mund. subterr. l. 6.*  
*Seft. 2. c. 1.*

I say that the Egyptian Nitre is so solid that it is cut out into Vessels. So the latter. *Nitrum juxta Cairum calore Solis, totum in lapidem, vasis conficiendis aptissimum convertitur.*

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Egyptian



Egyptian Nitre may be turned into such Salt-Petre as ours is *Ergo*,  
*That Salt-Petre which is now in use, and that which the Ancients used, is the same.*

**T**O paralel this Argument ; is not this as good an inference, I can turn *Sublimate* into *Mercurius currens* or *Quicksilver* ; so as that the *most part* of it be such: *Ergo*, there is no difference betwixt *Mercurius Sublimatus* and *Quicksilver* ; and *Ergo*, whosoever makes use of *crude Quicksilver* makes use of *Sublimate*. Or, is not this as good a Demonstration, I can turn the *greatest part* of *Salt-water* into *fresh*: *Ergo*, *Salt-water*, and *fresh* are the same: and they that drink the *former*, and they that drink the *latter*, use one and the *same* drink. Or may I not demonstrate that the *Ancients* did *season their wines*, and *Eat* that which our workmen call their *raw liquor*, and put the Question out of doubt thus. I can turn *Egyptian, Armenian, or Macedonian Nitre* into *Salt-Petre* : I can turn the *raw liquor* into *Salt-Petre*: *Ergo*, the *raw liquor* and the other *Nitre* are all one, and they did *eat* (not *drink*!) this *raw liquor*. I am so well pleased with these kind of *Demonstrations*, that I cannot but suggest more of them viz. I can turn *Gunpowder*, the *greatest part* of it into *Salt-Petre*: *Ergo* *Gunpowder* is no new invention: & the *Nitre* of the *ancients* & our *Gunpowder* were the *same*. Or, I can turn native *Cinnabar* even farre the *greatest part*, 13 ounces of sixteen) into *running Mercury* or *Quicksilver*: *Ergo*, the *Cinnabar* and *Mercury* are all one, and whosoever useth or diggeth up the one, doth in *Specie*, use and dig up the other. But, what if Mr. *Henshaw* had lighted upon such impure *Egyptian Nitre*, as upon refining had yielded more of *common Salt*, then of *Salt-Petre* ( which I shall shew to be possible enough ) had he then Demonstrated the point ? Or would it not have been made *evident* that the *Nitre* of the An-

cients; and our *Common Salt*, had been all one; and that when they used the one, they used indeed, nay in *Specie* the other?

But Mr. *Henshaw* though he could not get any *Egyptian Nitre*, is apt to think that the Ancients did not understand the way of refining their *Nitre*, as we do: and that hence arise the different descriptions

To shew the differences betwixt these natural productions of *Nitre*, & what Art generates, consider that passage of *Kircher*: in *mund. subterr. l. 6. Sect. 2. c. 3.* Nitrum non purgatum continet ut plurimum tres substantias, *Alumen*, *Salem crepitantem*, et *Nitrum essentiale*, quæ ex ejus distillatione reperiuntur: *Alumen* quippe calcinatur cum fervore quodam et bullitione: *Nitrum purum* inflammatur consumiturque; *Sal* crepat, exilitque; probat id gustus *Aluminosus Salsus, nitrosus* — and a little after. Non est *Misæralium* mixtorum fodina, aut vena metalliæa, cui nescio sanc qua insita ambitione non associatur *Nitrum*. Inter cetera *Sali*, *Alumini Ammoniaci*, ceterisque *Salibus*, veluti, cognatione, proximis sibi non tantum adnascitur, sed ea suis divitiis implet.

of their *Nitre* and our *Salt-Petre*: which I grant to be true; but yet those *accessionall Corpuscles* of so many different natures, participating of the natures of *Earth*, *common Salt*, *Allom*, and *Salt-Armeniac* (and God knowes what else) make a very great difference betwixt the one and other, such, as in the common naming of things (even by *Philosophers*) may well serve to rank them as different. They will not have the same colour, nor the

same tast, nor burn in the same manner, nor appear in the same figures; they will not serve for the same uses, being Chymically Analised, they will not yeild the same constituent principles. In fine, and upon which the controversie most depends, It will never appear that they were both made the same way. So that Mr. *Henshaw* by his *Demonstration*, had no way ended the controversie.

To shew his *Ignorance* a little more, I would have him to know that the Ancients had not only dark coloured and stony *Nitre* (which he informes us of out of *Pliny*) but white, and of those other colours I mentioned out of *Hofman*, and he out of *Galen*. And that the *Armenian* and *African Nitre* would have made more for his purpose, such as *Avicenna* and the *Moors* did use. And that the *Moors*, did either refine their *Nitre*, or Nature in *Barbary* was kind to them in producing better than yet we receive thence, will appear from the account of *Nitre* or *Baurakh*, which the *Prince* gives.

*Nitrum*



*Nitrum probatissimum est Armeniacum, leve, crustosum, friabile, spongiosum, albo, aut roseo, aut purpureo colore, mordax: et Africanum quidem Nitrum cum ceteris Nitri generibus comparatum habet se veluti Nitrum ad Saleem. Non estur autem Nitrum nisi magnam gravemq; ob causam. Nitri spuma est tenuior Nitro, ejusdemq; est potestatis. Laudatissima est vitrea (some read it molliuscula) ac fractu comminaturq; perfacilis.*

Avicenna: Canon  
med. lib. 2. l. 7.  
2. pag. 17.  
Edit. Plempij.

Insigniter abstergit, et abluit, praesertim Africanum, et abradit, et purgat, crassos humores incidit. Atq; omnibus aliis Nitri speciebus modica inest adstrictoria vis simul et abstersoria, levis propter salsuginem, quam habent, praeterquam Africano, hec enim nullius adstriktionis est particeps, sed purum putam abstergens est et validum: Sali autem adstrictoria inest potestas, sed absteritoria non nisi levis et modica.

Out of which it is evident that the African Nitre, was free from the mixture of common Salt, and came very near to our Salt-Petre (especially the Spuma Nitri, which perhaps was Crystals of Nitre) in resemblance and operation; but the Armenian Nitre was mixed with common Salt. But that they did Elixivate it out of the Earth I do not finde.

In the end of this page he tell us that in the refining of Salt-Petre there is besides common-Salt, a certain greasy Oil attending it, which doth by nature so wonderfully adhere to every part of the Petre, that the separation of it is the sole cause of the great charge and labour that is required to the refining of Petre. This is true, but I cannot find that our Salt-Petre men do call that Oil the Mother of Salt-Petre, but quite another thing, which I shall explaine hereafter.

Pag: 261.  
262.  
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In that other way which is followed by Pietro Sardi Casimirus Semienowicz and Agricola and other Forreigners, there is not that trouble in the making nor those Mothers that occurre in ours.

I cannot but take notice of that citation which Mr. Henshaw makes use of out of the Exercitationes of Scaliger. *Sublustris purpura quasi splendor quidem in Salis-Petra terris saepenumero est a nobis observatus.* This is perfect falsification of the text in Scaliger, & occasioned by Mr. Henshaw his not understanding well the Latin-tongue: Scaliger doth not hold that Salt-Petre is a fossile Salt as he reputes the Nitre of the

De subtil: exor  
c. 104. Sect. 15.

Ancients to be; but to be a more *subtile* Efflorescence sticking upon the rocks, and dried by the Sun, and therefore called *Sal Petra*, differing from the other in subtility of parts, (as I related before) and hanging upon the stones like *Iceles* which are in Latin called *Stiria*, & *Cirri*: but Mr. Henshaw, not knowing how to English the word *Cirri*, nor having Patience to learn, Substitutes *terris* for *Cirris*, the text running thus. — *Sal fossile Sale marino Crassius est, tum propter coctionem, tum propter materiam: huic enim aqua, illi terra plus. Utrunq; autem ipso est Sale-Petra minus tenue. Sudor enim est a Nitri quibusdam principiis secundum aliquam proportionem, sed adeo tenuis, totus ut Spuma sit, totusq; abeat in ignem.* — *Quod haeret rupibus, in quibus insolatur, ac propterea Sal petrae dicitur, analogiam habet, atq; affinitatis naturam cum ipso Nitro, sed aereum magis est, atq; ad Aphronitri potius veterum speciem vergens. Etenim sublustris purpurea quasi splendor quidem in Salis Petrae Cirris saepenumero est a nobis observatus.* Out of which it is manifest that Mr. Henshaw altered the text grossly, and that Scaliger meant no more than to compare those *Cirri* or *Stiria* or *Iceles* of Nitre with the *Aphronitrum* of the Ancients. And however those *Crystals* are white with us in our houses, yet to evince that they may be as well of another colour, as the *Aphronitrum* described by the Ancients, he saith, he had often observed in the *Salt-Petre* as it *Chrystallised* on the rockes a colour inclining to purple.

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“ And he that shall boyl a *Lixivium* past through a *Salt-Petre*-Earth, up to a consistence without filtering it through  
“ ashes, or giving the Salt leave to *Chrystalize*, may perhaps  
“ find something not unlike the *Nitre* of the Ancients.

I never thought highly of the observations of these men, and Mr. Henshaw here serves me with an instance so pregnant that I cannot pass it by. He pretended in the foregoing page to much converse with the makers and refiners of *Salt-Petre*, and to some curiosity in his own Experiments about it, but (alas) how vaine are his pretensions! how superficial his enquiries and observations! how little of accurateness is there in those *Scrutinies* which ought



ought to be so *Criticall* and *Severe*? where is that Certainty which we are to have from *them*, inferior to no *proofes*, but what convey unto us the *Holy Misteries of our Religion*! He observed before that there was a certain *greasie Oyl* in the *Minerall*; That *Oyl* is of such a nature, that if it be not separated from *Petre* it will never *Coagulate* into any *Cry-*  
*stalls*, or *imbody*: (I speak of our *Petre* to which he refers us) and it is his own own observation (pag 273) that after the *Salt-Petre* Liquor is *CrySTALLIZED*, there will remain some part of it that will not *coagulate*, being *greasie* and it must again pass the *ashes* before it be *boyled*, or it will never generate any *Salt*. The truth is *Salt-Petre* is one of the most odde *Concretes* in the world, exceeding *Sugar*: And howsoever Nature, and the Sun in the Earth, or *Nitre-*  
*pannis* at *Nile*, may transcend our Art in the production of it, (the peculiar *Aire* of the *Climate* concurring) yet with us it is not made with that facility Mr. *Henshaw* here insinuates. After the Workmen have extracted their *Lixivium* out of the *Earth* in such manner as Mr. *Henshaw* describes; afterwards they boil that *raw Liquor* according to what he saies, two daies and a night: and when it is boiled to the height, though it stand never so long in the cool, it will not *ChrySTALLIZE* or *Coagulate* into any *Lumps* or *Masse*, notwithstanding that it is impregnated with a vast quantity of *Salt-Petre* and *common Salt*, by reason of that *greasy Oyl*: To evince this, there needs no more but this Experiment, which is well known to the *Salt-Petre-men*; if any one will cast a little *grease*, or *tallow* into the boiler, when the liquor is past the *ashes* and depurated, and boiled to the height, it will hinder the *coagulation* of it, nor will it ever become *Petre*. This *Liquor* thus boiled up, and as yet *impure* is kept by them for the *Mother of Salt-Petre*. Having prepared this *impure Liquor* and boiled it up as to a  
*proofe* as they call it, they put it into a *Tubb*, which they call the *Mother Tubb*. And this will never *coagulate*, nor *CrySTALLIZE*, but is called the *Mother of Salt-Petre*.

G. 3.

And

This Experiment of casting in the *grease* will not succeed in the refining, but in the first generating of the *Salt-Petre*. Besides it will boyl ever with that violence that they know no way to allay it: This happens more if *Soap* be cast in.

And that for this reason, because that to make *Salt-Petre*, they boyl another Copper-full to the just heighth, and when it is come to *that*, they put into it some of *this Mother*, and (as soon as it begins to boyl) they lade away as fast as they can the whole liquor into their Ash-tubbs, which when it is passed through, it will at the second boiling, let fall the *common Salt* and *Salt-Petre*, as he and I shall declare presently. At *Warwick* they boiled nine tun of *raw liquor* at once, and when this proportion was boiled to an heighth, they put in about half a tun of the *Mother*, and so made it. This is the way to produce the *Mother* when they are destitute: But when they have once made *Petre*, they keep that Liquor which remaines after the *Crystallizing* in the *panns*, that is kept in *Tubbs*, and is called the *Mother of Salt-Petre*, and this they carry about with them where-soever they go, thereby to save them the trouble of making *new* in the manner I described. Having declared thus much

This *Mother of Salt-Petre* is not so called, as if the Elixivated Liquor having been boiled and passed the *ashes* and after boiled to a *proofe*, would not let fall the *common Salt* and coagulate into *Petre* at all: but because by these meanes it generateth a great quantity of *Petre* and the work is made much more easie. And it is observable that the *Mother* which remains after the generating of *Petre* is much more Efficacious then what is made otherwise. If the *raw Liquor* be, by negligence boiled too high it will become extream *Oily* or *greasy* nor can it be cleared of it by *ashes*, except it be put in as *Mother*, to other boilings, and so pass the *ashes*. If the *Mother* be put in too soon it spoils the boiling; and if it beil in after tis at the height, it will over the furnace.

in order to the generating of *Salt-Petre* amongst us, I leave my reader to judge how much Mr. *Henshaw* clears up the matter by his imperfect accounts from *Barbary* and *Pegu* about the natural productions of *Nitre*. In which I observe that there is no account given of the nature of the *soile*, nor of those *corpuscles* that impregnate the *Aire* there, nor of the *times* of

the year in which it is generated, nor of the influence that *change* of *winds* and *weather* hath upon it. Nor how deep the *veines* of it lie, whether it be only generated in the *surface* of the *Earth*, and propagate downwards or whether it generate lower and propagate upwards. Whosoever shall make these reflections *with me* (and they are but necessary: I remember that where the *Sun* makes *Salt* in *Jamaica* at the *Salt-pans*, the *times* of the year and seasons of weather made



made a great alteration) he will think that it is not for this *Vertuoso* to blame the *Ancients*: And let any man consider the account which *Pliny* gives, as Mr. *Henshaw* cites him, and he will find even that man (as much, and as justly as he is condemned) was more accurate than our *Historian*. And if the learned *Theodorus Collado* passed this Censure upon his naturall History; viz. *Opus recreandis curiosorum animis, non Erudiendis Scientiæ cupidis, idoneum: nec Philosophicum, nec medicum, sed Historicum. Vir equidem fuit Studiosissimus; sed aliis in rebus occupatissimus (assiduitatem autem in Studiis artis requirit in medico Hypocrates) Aliquamdiu causas actitavit, ut de ipso Plinius alter ad Cæcilium (at necessaria est in medico,* in append. ad v. ait Hypocrates, τὰς οὐκ ἴσιν, didicisse artem à pueritiâ) tantum

56. Annos. vixit, breve tempus: Junior Erat quum Scriberet; (at ars longa) Totum illud tempus distentus impeditusq; quâ officiiis maximis, quâ amicitia principum egit, in Germania militavit. Itaq; horis succisivis, ex variis collegit authoribus pulcherrima quæq; suo arbitrio, lectaq; grata in unum digessit, per capita, nihil ex suo attulit: sed non potuit per otii angustias res exactè ponderare, et elimare: Sæpe autores aut linguarum imperitiâ, aut sensus sermonum ignoracione, non intellexit, ut optime in materiâ simplicium, Ruellius Dalechampiussq; annotarunt: in aliis partibus alii. I say if this Character be Justly fixed on *Pliny*; what credit will some deserve who are farre inferior in parts, in Judgment, in learning, and in curiosity to *Pliny*.

Laurentium de  
Error practic.  
c. 78 Sect. 6.

How will they be abused by *Artisans*, as *Pliny* by his authors? how much knowledge and Skill is requisite to enquire into the circumstances of *Mechanicall* productions? how much more to relate them? I could not avoid this digression, which any one will pardon, who considers what Just cause Mr. *Henshaw* gave me.

But I pray, which sort of the Ancient *Nitre* doth he think our *impure liquor* (if it were coagulated) would resemble? Since they had sundry sorts: as there be severall kinds of *Salt*, some digg'd out of the Earth; some made by the Sun out of Sea-water in the *Salt-panns*; some boiled out of *Salt-springs*; some made out of plants calcined: so there

were several sorts of *Petre* very much differenced in tast, colour, weight, shape; as I have shewed. The *African* was the best, and comes nearest of all to the *Aphronitrum* of the Ancients. Of this *Aphronitrum* I shall adde as little to what Mr. *Henshaw* saith, as he does to *Pliny*; they that have seen it can Judge better of it, then they who have not; but that which they found upon the rocks, and which *Scaliger* speaks of, was much different from what we observe in *England* in Vaults, and Arched Cellars or Walls. For that with us seems to be but the transudation of the *Saline* particles of the Lime and coagulating with some corpuscles in the aire, into an *hoare*, or *Chrystalls*; Nor did I ever see any but what was *white*: nor could I observe it to stick naturally to the Wall but in dry weather or when I made constant fires in my Chamber at *Oxford*; where it grew on the Walls near the ground, the Earth being higher much on the outer sides, then the floore within. At other times I supposed it too much diluted with moisture to stick on the Wall. But their *Aphronitrum* was of other colours, and grew out of naturall rocks and Vaults, and such was that which *Scaliger* saw. It is no strange news that Mr. *Henshaw* drew very good *Rock-Petre* out of those *Stiria*: nor is it any thing remarkable that a *Physitian* in *Shrop-shire* should frame a *Sal prunella* out of them, except he had given us an account of the differences betwixt that sort of *Petre*, and the *common* sort: As to the *Cures* he did with it, I would faine know whether they were such as could *not have been done* without it? and whether they were effected by that alone? or with the concurrence of other medicines? If the last, how comes the *Cure* to be ascribed to that *Sal prunella*? perhaps it was not Effected by it *at all* or *in part* only. If the *Cures* were such as might have been effected by other meanes, or by other preparations of common *Nitre*, what singular news did his *Shrop-shire* Physitian tell him? Every man of understanding knowes that crude *Petre* is as good, or better than that which is prepared by that *calcination*, with *Brim-stone*. And it is an usuall way of cheat with the Chymists by some little altera-



alteration in a Medicine, to pretend unto *Miraculous* discoveries in *Physick* and *such Cures* as never man performed besides, or before; and sometimes *their* medicines are but *old ones* though boasted for *new*. Such was that *Arcanum* of *Ivy-berries* which was whispered into Mr. Boyle's Eare for a *secret* against the *Plague*: which yet was not only the secret of *Helmont* (as he observes) but was commonly used in *England* in a *Plague* which happened *Anno Domini. 1540*. As my *old receipts* say: It is in the *Garden of Health*, and other *English* receipt-books that are in *Print*. It is in *Alexius Pedemontius's secrets lib. 1.* and out of him transcribed by *Antonius Schneebergerus* in his *Catalogue of Euporista* against the *Plague*. It is not easie to be imagined what a *padding* some men make about a small matter; and certainly much *learning* and *knowledg* were a thing very desirable in this age, when a little goes so farr (being set off with *impudence*) and acquires a man so *great* *repute*.

“ In the *torrid Zone* and barren desarts of *Africa*, the sands  
 “ are visibly full of *Nitre*, and those few *Springs* and *Wells*  
 “ that are to be found there, are by that reason so *bitter*, that  
 “ the *Moores* and their *Camells* are forced to make an hard  
 “ shift with them in their long *journies*. — I do not  
 understand the force of the Argument for the *bitterness*  
 of the *Springs* from the *Nitrosity* of the ground; since *Springs*  
 commonly participate not of the nature of the adjacent *soile*,  
 nor have their *Originall* where they discover themselves:  
 So *Salt-Springs*, and *Hot-Springs* are found in places  
 where the *cause* cannot be ascribed to the *Soile*, by reason  
 of the many other *Springs* thereabouts that are of a *different*  
 nature. And although *Baccius* be of his opinion, that  
 the *bitterness* of these *Springs* is from *Nitre*: *plures inter Ru-*  
*brum mare et Nilum amara aqua inveniuntur, ob substantiam*  
*Nitri quod in illis maxime partibus abundat, saporis exacte*  
*amari*. Yet I cannot assent to it, for this reason, that nei-  
 ther the lake in *Macedonia*, nor *Nile* (in which *Nitre* doth  
 naturally coagulate) neither of them are said to be *bitter*:  
 particularly the *Nile* is esteemed the best water in the  
 world *Suavissima illius fluminis aqua, quae alijs omnibus vi-*

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 R. S. Pag. 264.

Gabr. Fallop.  
de thermis c. 9.

detur praefenda. *Alpin. de med. Aegypt. l. 1. c. 10.* Yet this *Nile*, (Mr. *Henshaw* saith) washes the *Nitre* out of those desarts, and so becomes impregnated in such manner, as is related. Besides, *Salt-Petre* it self hath no such tast; nor the boiled liquor of it: and *Fallopins* saith, that *Salt-Petre* is rather to be discovered in waters by it's effects, than tast; For if it ever shew it self to the tast, it is by a certain *Saline purging*, and as it were a gently corroding acrimony, which affects the tongue, and with a quickness diffuseth the fresh fence of it, as *Salt-Petre* it self does. If *Nitre* ever makes water bitter, it is by reason of some heterogeneous mixture.

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“He observes that *Lime* doth strongly attract the corpuscles out of the aire, which either are *Salt-Petre*, or make it. ——— I wonder how this passage came to be approved of, since that when I made use of the like principles, in an account of some naturall *Phenomena*, relating to *Jamaica*, the publisher of the *Philosophicall transactions*, fixed a *Marginal* reflexion upon me as not solving the thing *Mechanically*.”

He tells us that *Salt-Petre* is the life of *Vegetables*, and that the face of the Earth could not produce them, if it were not for this *Salt*. Yet (pag. 266.) he tells us that in clay, or Sandy Earth little of it is to be found: & it is certain that our clay-grounds (that are of a very Stiffe clay, as in *Northampton-shire*) yeild as good Corne as any in the world; and as good pasture ground, and feed as large sheep, and as large a breed of Horses, as this Nation boasts of. And I have seen in places in *Jamaica*, where there is nothing of Earth or mould, but immediate rocks under the sand, I have seen prickled peares, *Mangraves*, & other trees grow, and *Melons* also. So all grounds that are *Gravelly*, or full of *Springs* yeild no *Salt-Petre*, yet do they abound in *Plants*: and even in pure water *Mints* will grow very ranke, in which the proportion of *Salt-Petre* is very small, as he confesses.

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R. S. Pag. 266.

“Husbandmen might make double or treble the profit they usually do of their *muck*, if they would lay it up under an *Horrell* or some covered place until they cary it out upon



“ upon their Land. — I would not have any man think that this improvement of a *muck heap* is the particular observation of a *Member* of the *Society*, for which all *Farmers* are redevable to hem. It was a thing known long agoe, and published by the *Writers* of *French* and *English* Husbandry. Not to mention others, take the words of *Sir Hugh Plat*, who lived in the daies of *Queen Elizabeth*, in his *Jewel House of Art and nature*, pag. 94. “ All those simple Sorts that leave their *muck-heaps* abroad, and subject to the weather, shew themselves to be but mean *Husbandmen*, and that they never tasted of any true natural Philosophy. For the Rain that falls upon those *Dung-hills* flowing down into the *Vallies*, doth also carry with it the Salt of the *Dung*, which dissolveth it self with the moisture : wherby the soil being afterwards laid abroad upon the land, doth little or no good upon it. But if thou wilt not give credite to my Speech, yet mark how the labouring Hind, when he carries his *Dung* to the Feild, how in discharging of his loads he leaves it in certain heaps together, and a while after he comes to spread it all over the ground, and layeth the same in equall level, and afterwards when the field happens to be sowed with Corn, thou shalt alwaies find the Corn to be more green and rank in those places where the same heaps were first laid, (after they have lain there some reasonable time ) then in any other place in all the ground besides : and this comes to pass by reason that the Rain which fell upon them hath carried even the Salt through them, and conveyed it into the Earth that was under them.

“ I have been told by an experienced work man, that no place yeilds *Petre* so plentifully as the Earth in Churches. --- This was told Mr. *Henshaw*; but as *Experienced* a man told me, that it was false; & particularly at *Coventry* lately. *Pigeon-houses* yeild much more; and even here we must distinguish : for if a *Pigeon-house* be built on *Springs* or *Gravel*, either the Eye in great-plenty: and the men came to desire the *Salt Petre*-men to work it, because he found it prejudiciall to his *Mault* which was not so good as when the Earth was less *Nitrous*.

Hist. of the  
R. S. Pag. 266.

At *Coventry* in  
a Floor where  
they couched  
*Mault*, there  
was so much  
*Petre* that it  
was visiblo to

there will be none at all, or little. *Petre* : The like distinction is to be used in reference to the Scituation of *Churches* : *Salt-Petre* is begot in the Earth by a kind of *fermentation*. *Stiffe Clay* hinders that, and *gravell* is either of nature that *imbibes*, and *destroies Salt*, or else it is too *open*, and so gives a *vent* for those particles to *exhale*, that should *ferment*, and by *fermentation* transmute or *Combine* themselves into *Petre*, as also derive some principles out of the *ayre*, which contribute thereunto.

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Pag. 266

“ Let the Earth be never so good, if it be laid on a brick Floor, or that is boarded, it will not be so rich in *Petre* as if it have free communication with the *Exhalations* of the lower parts of the Earth.—I am not satisfied that the streams arising from beneath concur to the production of it, because that the generation of *Salt-Petre* begins at the top, and from the surface of the Earth *multiplies* it self by *fermentation downwards*, which is the reason that the lower you descend, the less you find ; Mr. *Henshaw* confesseth that if the ground be good, it seldome exceeds ten Foot in depth; commonly but six, or eight Foot : In *Warwick* (which stands on a *gravell*) it descends not above one Foot, as they assured me, though it be rich in *Minerall* at the surface. Besides in *Warwick-shire* there were Pigeon-houses that were floored with stone and with pebbles which yielded as much *Petre* in proportion as any others.

He might have observed that the more *Southward* you work for *Petre*, and upon the Sun ( as they Phrase it ) the richer the ground is in *Petre*. And how old Mud-walls gather so much *Petre*, that it hath countervaild the cost to pull some of them down, and after rebuild them. The *Elixivated Ashes* laid in the Sun impregnated with the *Oile* and *filth* only, will in a short time breed *Petre* in the top, if no *Rain* fall.

“ If the Earth tast *bitter*, he is sure to have good store of *Minerall*. — This is not true, for the Earth hath not any bitter tast, but *Saltish* and pungent, with a quickness, such as is in *Salt-Petre*, Especially if you imagine in it a mixture of *common Salt* more or less, according as the Earth is. He



"He that shall cast Water upon a Ground fit to dig for  
 "Petre, will only sink the Mineral deeper into the Earth; but  
 "he that throwes Soap-suds on it, will quite destroy the  
 "Petre (as the Workmen have a Tradition) and it very well  
 "deserves a further enquiry. — It is impossible for Mr.  
*Henshaw* to minde what he saies, I think. If any man cast on  
 much water into a rich Earth, the water will not wash it only  
 deep (water descends not very deep) but dissolves the Petre,  
 and Soaks quite away with it, for that time. As for the  
 casting Soap-Suds on the ground, that it destroys the Petre  
 either for ever, or for that time, any more then much water  
 spilled would doe; it is but a foolish surmise: for should  
 one cast Soap-Suds into the Tubbs. as the raw liquor is ex-  
 tracting, it would do no harm; the greafe thereof not descen-  
 ding with the liquor, but lodging in the remaining Earth.  
 But should any one cast Soap or the Suds into the boiling li-  
 quor, it would not only boile over irresistably, but never  
 coagulate. So Soap (or Sugar) cast into the Churme is obser-  
 ved by Mr. Scot to hinder the butter to come.

Hist. of the R. S.  
 Pag. 267.

"That Salt-Petre, and the way of drawing it out of the  
 "Earth, now in use, was a moderne invention, is generally  
 "concluded by all Authors; but whether we owe it to  
 "chance, or the sagacity of some great Witt, is as un-  
 "known, as the time when it was first discovered.

Hist. of the R. S.  
 Pag. 267. 268.

"It seems to have many years preceded the Invention  
 "of Gunpowder, which by the Germans is ascribed to  
 "Constantine Autlitzer, or Berthold Schwertz a Monk of  
 "Friburgh, and was, in all probability, not long discovered,  
 "when the Inventor (as Polydor Virgil tells us) taught the  
 "use of Guns to the Venetians, at the Battail of Fossa Claudia,  
 "when they obtained that notable Victory over the Geno-  
 "veses Anno 1380. For there is mention made, both of  
 "Salt-Petre and Aqua fortis, in the writings of Geber, a  
 "Spanish Moore, and an Alchymist; but at what time he  
 "lived, is unknown, though it be certain, some hundreds  
 "of years before Raymund Lully, who lived about the year  
 "1333. and published some of his Books wherein he treats  
 "of Salt-Petre and Aqua fortis.

Vide Casimirum  
Semiconior  
Art: m. g. p.  
Artell, l. 2. c. 1.  
Pag. 61

It is apparently false even out of Mr. Henshaw, that Salt-Petre is no modern Invention. Nor can any man say so who knows that it is mentioned in the Scripture, in Pliny, Aristotle, Seneca, Dioscorides, Galen, Vitruvius, Philostratus in the life of Appollonius Tyaneus, Avicenna and many others, too tedious to recount. Nor is it less impertinent, that a Witt should speak it as a strange thing that Geber ( who by the way, was no Spanish Moor, but an Apostate Grecian, as I shew Mr. Glanvill, and I believe never in Spain, but in the Kingdome of Fez; and living one hundred years after Mahomet, could not precede Raymund Lully but by very few hundreds of years ) that He should mention Salt-Petre: though the mention of Aqua-fortis in him carry something of remarque. I demand of our Vertuoso whether Geber saith that the Salt-Petre in his daies was extracted and made as now? If he do not ( as I am confident He used the African-Nitre mention'd by Avicenna and others ) what needed he tell us that Salt-Petre is spoken of by Geber, whereas he had before demonstrated it out of Pliny, and shewed himself inclined to their Judgment who taught that our Nitre and that of the Ancients were all one?

A more Logically head would have thus delivered the thing here proposed by Mr. Henshaw.

There are several Mineralls that are called by the name of Nitre, or Salt-Petre: betwixt which the more accurate (that is the Ancients) did distinguish; so that one, the more impure was called Nitrum and Halinitrum; the more pure Aphronitrum; the most pure Spuma Nitri, or *apès nitre*, as Daleschamps observes. The Nitre or Haliniture was in Lapidaceous bodies sometimes digged out of the Earth, sometimes made by the Sun in the Nitraria or Canals of Nitrous waters. Of this last some being a better sort than others was called Aphronitrum, and was more freed from common Salt, and was gathered (as I may say) in the Nitre pannes, as it shot there in Lumps. Besides this there was a third sort of Spuma Nitri, which was the best of all: *Quae maxime laudatur: antiqui negabant fieri, nisi cum ros cecidisset praequantibus nitrariis, sed nondum parientibus.* So that it seems

Plin. l. 31. c. 10.  
lit. H.

Vide Galen. de  
Simpl. medic.  
l. 9.

Pliny l. 31. c.  
10.



seemes they took the first small loose concretions for the *Spuma Nitri* before they came to larger *Chrystalls*, or *lumps* & *stones*: upon which account *Galen* saith it is like to *wheat Flower*. Of this fine *Spuma Nitri* ( which I confesse is sometimes *Aphronitrum*; but not with *Acribology* ) it was found afterwards that it might be had in *Vaults*, distilling from the stones in *Ice-ickes*. And from hence, as also because it was found transfuding and coagulating on rocks, it came to be called by the Barbarous *Latines* after the *Moore*s had taught them *Physick*, and the *Materia Medica*, by the name of *Sal-Petre*. Besides these waies of finding *Nitre* there is another way of making *Nitre* out of *Elixiriated Earth*, which upon refining is brought to that purity as to equall the best *Spuma Nitri* and *Salpetra*, the Earthy particles and heterogeneous mixtures of common *Salt*, and other corpuscles that diversified the taste and colour and qualities of the former *Nitres*, being generally seperated from this: *Art equal-ling, if not exceeding the productions herein of Nature*. How much the *Salt-Petre* of the *Ancients* differed from ours, is not now to be discussed anew: certain it is that the Invention of *Salt-Petre* ( in it self ) nor of any of those natural productions of the *Spuma Nitri*, is not *moderne*. Nor did any *Author in the world*, till these appeared, conclude so. But as to this *Elixiriated Salt-Petre* whether it be the same with that which the *Ancients* commonly speak of, hath been questioned; and I have already illustrated the point. And whether the *Ancients* were acquainted with the present manner of *Extracting and refining it out of the Earth*? this hath been disputed by many; and it is affirmed by most to be a *moderne Invention*, yet so as that *Tartaglia* saith they knew it as plainly as they did *Beetony*. And the already mentioned and most diligent writer about *Gunpowder* saith. *Quod autem existiment nonnulli hunc Salem nostrum Pyrotechnicum esse recenter adinventum illud maximè falsum esse, vel hoc unicum argumento est, quod historici fide digni inventorem Pyrii pulveris vel summis laudum depradicent encomiis, vet tot convitiis execrationumq; nominibus proscindant, non quod Salis Nitri novam aliquam in-*

vide *Semicroni-  
micz, ubi supra*  
Pag 63.

See his judg-  
ment hereaf-  
ter, in his dis-  
course.

*Casimir. See  
microni-  
micz art.  
magn. artiller.  
part. 1. l. 2. c. 1.  
pag. 631.*

venerit Speciem ad perniciem Extirpationemq; humani generis, sed quod novum, necdum antehac usitatum pulveris nitrati, ex certis Nitri (jam tunc optime noti) Sulphuris carbonumq; portionibus mixti commentus fuerit compositionem. This Book was Printed at Leyden in 1650. and from hence any man may Judge how true that generall expression of Mr. Hershawe's is, that generally all Authors conclude it to be a modern Invention: and how impertinent that allegation of his out of Geber, and that ostentation of learning, is, in computing the time of Geber and Lullie's lives: wherein he mistakes too, for if we abstract from the authority of Leo Afer (to which I submit) it is not certain (or rather it is manifest to the contrary) that there did scarce intercede two Centuries betwixt Geber and Lully, if so much.

Vide Erastum  
de metall. Pag.  
III.

As to that he saith about the Invention of Gunpowder, it might have become our Vertuoso to have compleated his History, by taking notice of what our Country-man Dr. Read saith of it before that German Monk. I will endeavour herein to supply his omission of a passage that hath something of curiosity in it.

Dr. Alexander  
Read of wounds  
Sect. 15 Pag.  
107.

" Bertholdus Niger, Schwarth, or Black by Sirname. Anno  
" 1380. a Franciscan Frier, and an Alchymist, found out  
" the making of Gunpowder, and Ordnance which are now  
" in use: He only perfected this mischiefe: for the use of  
" Guns, although rude, was before: For in the time of Caro-  
" lus Magnus, Gamoscus, King of Frisland, killed the Count  
" of Holland, and two of his Sons with a piece, and Roger  
" Bacon who died about the year of our Lord 1284. maketh  
" mention of Gunpowder. Naclerus affirmeth powder and Ord-  
" nance, to have been Invented in the dates of Otho the  
" Fourth, Innocentius the third, in the year of the Redemp-  
" tion of mankind, 1213. Froissard Anno 1340 and 1353.  
" maketh mention of Guns. Petrarcha who died Anno 1374.  
" doth the like. (a) You may read in the History of Alp-  
" horsus King of Castile, when he besieged Algezira, a famous  
" town of the Moors, 3 Aug. Anno 1342. that they in the  
" town shot out of it bullets of Iron out of Ordnance accor-  
" ding to Mariana. Yea Petrus Matterus affirmeth that  
Bra's

(a) Sethus  
Calvisius Chro-  
nolog Pag. 752.  
Co. 2.



Brass Ordnance have been used by the *Chinoies* many ages ago. So that the Frier was not the *Inventor*, but *Perfector* of *Guns* and *Powder*. I have not opportunity to inquire into the citations of *Dr. Read*, but if I had been to write the History of *Salt-Petre* and of *Gun-powder*, I should have thought my self obliged to *this inquiry*, as much as to that which *Mr. Henshaw* begins with concerning the *Nitre* of the *Ancients*.

Here I must make a Protestation about the making of *Salt-Petre*, that I will not be understood to oppose *Mr. Henshaw* in any way, but such as is commonly followed in *England*; there is another manner of ordering it in *Agricola de Re metallicâ lib. 12. page 454.* which if it produce any *Phænomena* different from my observations, I do transfer all the discrepancies upon the variety of the process, and profess my own integrity and Candour in what I suggest. It ought to suffice that the men *Mr. Henshaw* conversed with all, and those that made it at *Warwick* did take the same course.

"If you are curious to know how rich your Liquor is before boiling, you may take a glass-viall, containing a quart, fill it with the common Water you use, then weigh it exactly; next fill the same glass with your liquor, and find the difference of weight which compared with the quantity of all your liquors, will give you a very near guess, how much *Salt-Petre* you are like to make by that boiling. — This is a very vain Experiment, and at best can hold true only in the richest mould that is found in *Pigeon-houses* in which there is little of the *Cubique* or *Common-Salt*. It seldom happens that their raw liquor contains nothing but *Petre*. They have oftentimes as much of common Salt as *Petre*, sometimes more, as in the raw liquor drawn from the floors of some houses. But besides the common Salt there is the mixture of other filth, and the greasy Oile, which will render the weight uncertain: except we think that the Salt in the Ashes supplies all that is lost in the percolation. It had certainly become our *Vertuoso* to en-

quire out of floors and the last contain much common Salt, the *Pigeon-houses* liquor cuts out (as they call it) or transmutes even that Salt, so as that there will be little or none in the end.

I

quire

Pag. 268.

That of *Agricola* doth agree with that of *Petro Sardi*, which I have added in the end of this discourse.

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R. S. Pag. 269

If the raw liquor be made with the two parts extracted from *Pigeons* Earth, and one

quire what became of that *greasy Oile* ; and what happens to the *Alcalifate Salt* in the *ashes*, since it is turned into *Salt-Petre* in the operation ; at least it is certain that as it is *totally* drawn out in the *percolation*, so it doth not turn into *Cubique Salt* except the *raw liquor* be of a *peculiar* sort ; as I have said.

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Pag. 270.

“ When you have boiled it up to that height, that a little of it flirts off the finger upon a live Charcoal, will flash like *Gun-powder* ( which for the most part falls out to be after two daies, and a nights boyling. ) — It is strange that any man should write such a thing as this : first, let the *liquor* be never so rich of the *Mineral* which seldom happens, and void of *common Salt*, yet will not that ( no nor the most refined *Petre* ) flash like to *Gun-Powder*. Secondly, where the *Cubique* or *common Salt* abounds in it ( be it more, or be it less ) it burns more slowly, and will certainly *Sputter* in the burning. In fine, *this* onely *Sparcles*, being flirts into the fire : the other tryall, by seeing that it is boiled high enough, if it hang like *Oile* on the sides of the *brassen Skummer*, is false : for if it be boiled so high, it is too fat to be recovered by passing the *Ashes*, and must be used as *Mothers*.

“ At what time upon triall an hundred weight the of liquor contains about thirty five pound weight of *Petre*. — This is often times false, if ever true : for if the *liquor* hath more or less of *common Salt*, the product of *Salt-Petre* varies accordingly. And I say, it is seldom ( if ever ) true, because that in *Warwick*, they seldom had two hundred weight of *Petre*, out of Nine Tunne of *raw liquor*, yet did they never boile it near to that proportion in the *copper* which would agree with his computation.

“ Fill up your Tubs with any sort of wood ashes. — He forgets here the putting in of the *Mother of Salt-Petre* : of which I have spoken already. And in his prescription of any sort of wood ashes, there is an omission of a considerable circumstance : for those ashes are best which abound most in *Salt*, of which there is a great difference : I remember in *Jamaica* to have tasted the ashes of several woods, and found scarce



scarce any Salt in them; and the *Ashes* of oak only the *Petre-men* term'd a dead *ashes*: and *Chymists* generally observe that *Lignum-vitæ* yeilds little of the fixed Salt. If the places where the *Salt-Petre-men* do work, do not yeild them *ashes* of wood that may serve their turne; they use then either the *ashes* of *Broome* burnt as it is green; or ( which is no wood ! ) the *ashes* of *green ferne*, or *bean-straw* or *pease-straw*, which need not be burnt green; the older the better: they are better then *wood-ashes*: Concerning

the reason of their burning the *Broom*, and *Fern* green, I could suggest some remarkable observations, as to the different quantities of *Salt*, ( and consequently of vertues ) in plants before their coming to *maturity*, or full growth; but I shall Satisfie my self now with shewing the *mistakes* and omissions of Mr. *Henshaw*, whereof this is one, of which I

should have spoken ( living in a place where the much use of the *ashes* of *green Ferne*, in washing, gives people occasion to observe the difference of *Ferne* at several growths, and the difference betwixt those *ashes* and others ) but he gives me no occasion.

“ Note that toward the end of your boiling, there will arise great store of *Scumme* and froth, which must carefully be taken off. — He might have told us what use this is good for: if this *Scumme*, and the *ashes* through which the *Liquor* is percolated ( *insipid*, but impregnated with the greasy *Oile* ) be put into any convenient ground, they will generate there *Salt-Petre* in a shorter time, and much greater quantity then otherwise would be found there. Besides, if there rise such great store of *Scumme* and *Froth*, ( which must needs vary as the *raw liquor* is more or less fowle ) how shall any man conjecture, by weighing his *raw liquor* against *common water*, at the quantity of *Salt-Petre* he is to receive ?

“ Usually about that time it lets fall some *common Salt* to the bottom which you must take up with the said *Scum-*

All woods say our *Petre-men* if burned green, yeild a *Salter ashes* then otherwise. But for *ashes*, the *Ash* is best; the young *thorne*, Second; the *Elm*, third; *Firrs* and *Fern* burnt green ( the younger the better ) yeild a *Salt-ashes*; if dry, not so. Hence those *ashes* are not used in bucking of Linnen. The *Salter* tho *ashes*, the lighter. If they lye dry a while, or till they be old they are the better for *Petre*; They gather *Saltnefs* by lying.

Zwelfer. in  
Pharmacop:  
Augustan: de  
Sale Ligni  
Sancti.

Hist. of the Arts  
Pag. 271.

Ibid;

*mer.* — If there be a great quantity of *common Salt* in it, it falls almost all to the bottom, during the boiling: what remains of *common Salt* in it, granulates against the sides, as it cooles, which at *Warwick* they suffered to be done in the *Cauldron*, without any distinct *Tubb*; what an observation did our *Vertuoso* looke here concerning the discovery of two so different *Salts*, at first swimming and mixing *indiscernably* in the *liquor*; and afterwards parting in this manner,

When the liquor is suffered to coole in the Copper, and begins to granulate, my artists laded it out into the shooting-pannes, leaving the turbid and *feculent* settling at the bottom: which (though Mr. *Henshaw* omit it) they put in again to the *raw liquor*, at any time, as it boiles: and it is their Judgment, that it increaseth the *Petre* though much of it be *common Salt*; the liquor yeilding a sensible quantity of *Petre* thereupon more then otherwise.

the one *Chrystallizing* whilst the *liquor* is hot and boiling and remaining in great quantities: the other coagulating into *Sexangular*, not *Cubique* shapes, and that when it is cold and divided into *Shallow pannes*? Here are *Twenty pages* lost, that might have been *Expended* in *Luciferous Experiments*.

Hist. of the R.S.  
Pag. 272.

“ When the Liquor is brought to this pass, every hundred weight of it containeth about threescore and ten pound weight of *Petre*. — Any one may Judge how true this is by what I have said before: it may happen that half of it is *common Salt*.

“ When you find the *Cubique Salt* to granulate and stick to the sides. — Why did not he disgres to tell us why it granulates at the sides when it cooles, and falls to the bottom when hot?

“ Draw of your Liquor into deep wooden Traies. — Which if you do, it is ten to one but the weight of the Liquor will break out the sides of them: wherefore our men think it good Husbandry to use *Brass-pannes*.

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Pag. 273.

“ That part of the Liquor which is not coagulated but swims upon the *Petre*, must be carefully powred off, and being mingled with new liquors, must again pass the ashes, before it be boiled, else it will grow so greasy it will never generate any Salt. — This is the *Mother of Salt-Petre*, of which I spake before. And if it (or the *raw liquor*, being boiled too long) grow so greasy, as not to



to be able to coagulate by any meanes, what must we think of his designe to counterfeit the *Nitre* of the Ancients?

“ Then cast in by degrees a pint of the strongest Wine-vinegar, or else four ounces of *Allom* beaten to powder ( some choose burt *Allom* and you shall observe a black Scumme to rise on the top of the liquor. — I saw as good *Petre* made at *Warwick* as any in the world, without this cautelous refining: they cast in nothing but good *Scouring* water, such as would bear *Soap* well, and continued the pouring of it, as long as any *Scumme* would arise. Nor did they lade the *Liquor* out into any *Setling Tub*, ( as he proposeth ) but suffered it to stand in the *Copper* till it began to *Chrystall* against the sides in such manner as the common *Salt* doth *Chrystallize* in the first boiling: then did they take out the liquor, leaving the *faces* and all that is foule at the bottome.

Hist. of the R. S.  
Pag. 273.

Here I must take notice of an omission of Mr. *Henshaw's*, in that having brought his refined *Petre* to *chrystall* & *rock* in the *pannes*, He then slightly transfers it into a *Tub* with an hole in the bottome to drain, and when it is dry, it is fit for use. But I found that our workmen took more care: For they took the large fragments of the *Nitrous rocks* and placed them in *Live-ashes* upright, and so the ashes did drain from the rocks that greasy and *Motherish* substance which adheres to the *Petre* extrinssecally as it shootes, and which ( if not separated this way ) vitiates the colour, and takes of so much from the Efficacy and goodness of the *Petre* as there adheres of *Grease*. As for the smaller *Chrystalls* and *pieces*, which are too little to be so ranked, they are placed upon a sheet spread upon the said *ashes*, and so that *Motherish* humidity drains from them, and they become clear and white as *Snow*. The ashes being impregnated with this *Oile* are enriched in order to the generating of more *Petre*, when the liquor comes to be passed through them.

“ The Figure of the *Chrystalls* is Sexangular, and if it hath rightly shot, is fistulous and hollow like a Pipe. —

Hist. of the R. S.  
Pag. 374.

This discourse concerning the figures of Nitre crystallized proceeds upon the supposition that the Crystals are of that shape, which is a thing I never yet saw, at the making of Salt-Petre, nor Glauber de Signat Sal. nor I believe Mr. Henshaw. The shapes of the crystals are very irregular. I found none fistulous: and the Rocks of Petre do not seem to be made up of sexangular concretions at all. I have seen else-where some shaped sexangularly, but not fistulous, no

more did Glauber. I observed, and so do the workmen, that in the coagulation in the pans there is commonly some protuberant concretions, which with the Crystals distinctly composing them have some resemblance of a rose, and were so called by our Artists. Why did not our Mechanic take notice and Explain that? The Crystals are the worst Petre, and shoot last, they burn as if there were resuscitated Allom in them; they make worse powder, and leave more faces upon burning; and our workmen will not allow them to be the best sort of Petre: whether there be some interceptions of Aire and water incorporating with the Nitre in shooting; or whether there be any resuscitation of Allom, which makes them burn with that Spumeous Ebullition, let such consider as magnify Crystals of Nitre in Physick; for my part I am satisfied that all preparations (how laborious and curious soever) are not improvements. Upon a solution of Petre in water, where the Liquor is not impregnated so high, as at the works, one may see such Crystals as Mr. Henshaw speaks of, if he proceeds carefully, and (as my workmen say) I have not had leisure to try since the intimation I use Barbary Petre, which is that which is usually sold. But I never visited the works, but I thought of a passage some where Mr. Boyle hath, that he could never observe such a regularity in the Crystals of Nitre, as is spoken of: in so much as he seems to doubt the assertion; if my Memory deceive me not. But that sometimes it happens, is certain; and that there are alwaies beautifull figures and complications above Mechanisme.

He should have done well to have told us, how this Mineral comes to be thus figured? and evidenced it unto us that it was performed Mechanically: This had been a much more generous undertaking, then the suggestion of an impertinent conceit of his, which I shall speak of presently; He should have shewed the configuration of the particles, what it is that gives them Motion; what it is that Sizeth them, and preserves them fistulous: This had been a curiosity worthy a Philosopher, that understands something more than common Formes. To tell us that nature acts the Geometrician, or that it is done by the agitation of any subtile Spirits, or matter, acting in a determinate manner upon particles of one configuration, whilst the others are agitated and cast off by a different Motion: I say this is no satisfactory discourse, nor very comprehensible, when we reflect upon the Liquor of the Salt-Petre how thick it is crowded, and into what fistulous Crystals it coagulates. For all this while, a man does not understand how Ingenious nature doth particularly and distinctly figure out those Crystals, nor the manner of that Speciall Geometry which she practiseth in this case. Should an Indian or other Ignorant person, ask concerning the making of a watch, or other piece of Clock-work, what was the reason that the hand did so exactly discriminate the houres; what was the reason of its so slow and equable motion

bearing



bearing such an unerring correspondence with that great revolution of the Sun ? and should any man answer that it was a peculiar conformation of parts (which consist of several mettalls) differently shaped, and placed in order to the composing of that *machine*, which the ingenious *Artist* had achieved: though this answer carry much of truth in it, yet doth it not solve the *doubt*, or satisfy a speculative *inquirer* : Nor if he continue his question further, will he be satisfied with a narration that those very materialls are apparently *Sand, Lead, Steel, Iron, Brass, &c.* differently agitated according to determinate *rules of motion*, whereby it happens that it keeps so *certain and constant* a course, in declaring of *Time*. This kind of *general knowledge* may content such as have not leisure to engage in more *accurate Theories*; but he deserves not the name of a *Mechanick Philosopher*, who doth not perspicuously declare the *matter*, and *configuration* of each part, the *Size and Use* of each *wheel*, the effect of each *Spring and weight*, and this either *Mathematically* to the understanding, or by *ocular demonstration* to the Eye. This had been an undertaking that would have ennobled Mr. *Henshaw*, had he gone through with it : and if he and his fellows despair of bringing things to this *perspicuity*, they had as good suffer us to be content, with our old *Formes*, and combinations of *Elements*, with which the world hath subsisted so long, and *Mechanicall ingenuity* been so farr advanced, that whosoever is acquainted with the *delicious Luxury* of *Asia, Greece, and Rome*, will easily think all our *performances*, nay, *pretenses* not to equall their *reall Enjoyments*; and if there be any *one thing* in the improvement whereof our present *Artists* (I must not say *Philosophers*; the *Inventions* we boast of, being not theirs, but the discoveries of more *common and thick Skulls*) *Glory*, it is overballanced by the multitude of excellent things in which they surpassed us.

Mr *Henshaw* declines all these Speculations, to acquaint *Hid.* us with some other that he hath of this *Salt*, " Which  
" if he could clearly make out, would lead us into the  
" knowledg of many noble secrets in nature; as also to

"a great improvement in the Art of making *Salt-Petre*.— I am so great a well-wisher to the *publick good*, that I shall be willing to enquire into any thing, that may advance so great & Staple a commodity as *Salt-Petre* is, and alwaies will be as long as the use of *Guns* continues: and since it is the most plausible pretense for the establishment of the *Royall Society*, that they may and will meliorate and improve the *Manufactures* and trading of our *Nation*, let us with some heedfulness observe this *publick Essay* and tryall of their Skill and Utility.

Hist. of the R. S.  
Page. 275.

"First then you are to observe, that though *Petre* go all away in *Gun-powder* yet if you fulminate it in a *Crucible*, and burn of the volatile part with powder of *Coal*, *Brimstone*, *Antimony* or *Meal*, there will remain a *Salt*, and yet so fixed (very unlike *common-Salt*) that it will endure the force of almost the strongest Fire you can give it; which being dissolved into water and *Spirit of Nitre* dropped into it, till it give over hissing (which is the same with the volatile part that was seperated from it in the fulmination) it will be again reduced to *Crytalls of Petre*, as it was at first.

De ferment. c. 3.

Anatom. Vi-  
trioli tract. 1.  
c. 10.

This Curiosity was the Invention of that Honourable personage Mr. *Robert Boyle*, & a treatise writ upon the subject, which he was pleased to impart unto me long before *Glauber* writ any thing of that nature, and I translated it into *Latine*: It hath been made use of by Dr. *Willis* as an instance whereby to shew that *Chymicall Fires* do not generate new substances, but only divide asunder the first constitutive parts, and exhibit them. *Angelus Sala* did reproduce *Vitriol* out of the parts which he had separated *Chymically*, by remixing them together. But neither do these few instances in the behalf of the *Chymists* out of Materials of a Slight texture, serve to any other purpose then to make us more doubtfull, not more intelligent: For there are so many demonstrations, that those furnaces do generate new substances & that according to the different regimen of the Fire, and the difference of it, (being open or close) and the different Vessels and the different processes: it being also evident that by other meanes quite



quite discrepant parts are disclosed, than what those *venations Fires* could ever reveal. that I think it impossible for any to submit his Judgment to such *Convictions*: And that the observations which Mr. Boyle raised from that Experiment were of such importance as Mr. Henshaw thinks, is a point which such as measure *speculations* by their *utility*, will hardly grant.

"First you are to observe that though *Petre* go all away  
"in *Gun-powder*, yet if you fulminate it in a Crucible, and  
"burn off the volatile part with powder of Coal. —

"There will remain a Salt, and yet so  
"fixed, that it will endure the force  
"of almost the strongest fire &c. —

This same to me doth not seem so extraordinary *aphenomenon*, so as to merit an *unusuall* regard: for that Gold is as fixed a body as this Salt, is undeniable; and yet in the defla-

gration of *Aurum fulminans*, its particles fly away, though they may be caught under the forme of a purple powder, if the fulmination be performed in a close Vessell, as Dr.

*Willis* observes, *De fermentat.* c. 10. so in Salt *Armoni-*  
*ac*, the common Salt will undergo many sublimations, without deserting the concrete: and yet it is an easy thing to reduce it to such a state of fixedness as amazeth our *Virtuo-*  
*so*. Many other instances might be alledged: and therefore I proceed to tell the world, that though Mr. Henshaw entitle Mr. Boyle to this Noble Experiment, yet what he repeats of it, is taken from *Glauber* out of a book of his printed in 1659.

*de signaturâ Salium* &c. — pag. 28. whom yet he names not. This is manifest from this that Mr. Boyle useth live pieces of coal to calcine the Nitre with: *Glauber* in his *Pharmacop: Spagy-*  
*ric. part. 2. p. 28* & Mr. Henshaw cast in the powder of coal. Mr. Boyle Speaks nothing of calcining it with *Brimstone*, or *Antimony*, which *Glauber* doth: and so doth Dr. *Willis*: But the former prescribes the *Regulus Antimonij Stellatus* Con-  
cerning the Experiment as it is performed with coale, I have this Scruple; That I am not satisfied by any observations

In this reproduction of *Petre*, it is observable which *Glauber* suggests: viz. that though the acid and alcalifate Salts mortify Each other presently; non tamen e vestigio fit Sal Hermaphroditicus, sed necesse est ut aliquandiu in aere collocati vitam et naturam ardentem quâ dignis ipsos nudavit, recipiant. Hec illis inicamus qui sales sine aeris opera, animari posse forsân opinarentur. *Prosp. Germ. par. 1. Pag. 101.*

determent. c.

10.

De subtil. ex-  
ercit. 104. 15.

See the proof  
of this in the  
account of Pie-  
tro Sardi  
which follows.

If the coal be  
not broad the  
Petre as it  
burns will run  
over it.

Mr. Thibaut in his Art of Chymistry ob-  
serves, that a Spoonfull of Nitre cast into a  
pot red-hot, will presently be in a flame and  
vanish all away in Smoak Pag. 58. See him  
also Pag. 53. Where he prepares Salt of Tar-  
tar. So Glauber. Nitrum puræ ardenti im-  
positum totum conflagrât et in auras Evanescit.  
Dowmac. Spag. p. 2. p. 95.

\* Dr. Ed: Jorden of naturall Bathes. c. 7.  
pag. 35. edit. in 40.

† Jo: Roberts in his compleat Canonier, pag.  
49.

I can make, that Salt-Petre, if it be rightly purified, will up-  
on deflagration leave any such Salt behind it at ail. But that  
wheresoever any such thing remaines, it is the product of a  
common Salt, and other heterogeneous mixtures incorporated  
with the Petre: I am moved to this doubt, by the saying of  
Scaliger concerning the best sort of Nitre which he  
terms Sal-Petræ: viz. *Tam enim Sal quam Nitrum ita uritur,*  
*ut cineris quippiam relinquitur: Sal-Petræ universum absumitur*  
*ab igni.* And in the tryalls of Salt-Petre which are made by  
the best Artists Pietro Sardi & Casimirus Semienowicz, it is requi-  
red of good Salt-Petre, that it burn all away upon the Table,  
leaving no impurity or sculency behind. I have taken of the  
best Salt-Petre at Warwick oftentimes to make this Essay, and  
also to compare the Crystals, and white-rock-nitre: I put the  
pieces upon a broad Pit-coal red-hot, and could see a differ-  
ence in the burning of Each; and a different quantity of that  
incombustible matter remain according to the different pu-  
rifications; insomuch that as farr as my Eye could guide my  
Judgment, out of an ounce of the best Rock-Petre there could  
not remain half a dram if a scruple of that fixed Salt which  
Mr. Henshaw speaks of. In the Crucible indeed upon burn-  
ing with coal there did remain about a third part, when I

burnd the best Petre: and more, ac-  
cording as it is more impure. \* Dr.  
Jorden observes that the difference  
betwixt Salt-Petre and the Ancient  
Nitre, appears in this, that a pound  
of Nitre being burn'd, will leave  
four ounces of Ashes; Salt-Petre  
will leave None. † And the common as-  
sertion of our English Gunners about  
the Goodness of Petre, is, If it be laid  
on a board, and a coal put to it, and  
it burne into the board, and leave

nothing but a black colour, and rise with a long flamed  
ventosity and exhalation, it is well refin'd. But since the ob-  
servations of Scaliger, & those other Artists of unquestiona-  
ble credit, and my own Experience teach me that the quan-  
tity



city of what remains after the deflagration of *Nitre* depends upon its *impure* and *Saline mixtures*, and that pure *Nitre* burnt openly leaves nothing behind it; I am apt to believe that either there is something in the nature of the *Crucible*, or in the manner of burning it in those Vessels, that causeth that *Phænomenon*. And perhaps there is not so much of untruth (upon this ground) in that saying of *Bequius*, that he that operates well shall draw a pound of Spirit from a pound of *Nitre*. Mr. Thibaut saith that in a Crucible it consumes almost quite away. pag. 34. Tyrocin. Chym. l. 2. c. 4.

But let us suppose that there doth remain, otherwise than by accident, this fixed Salt, our *Philosopher* saith it is very unlike common Salt. A doughty *remarque*! It is very like any *Alkali*; if it be not common Salt reduced to an *Alkali*: though the mixtures of *Allom* and *Vitriol* may give it a little diversification sometimes. But where is the improvement he promised us all this while of *Manufacture of Salt-Petre*? Why it amounts to this! Take a pound of the best purified *Nitre* that you can buy, such as is already fit to make *Gun-powder*, distill it with three, four or five times as much *potter's Earth* prepared in a *Glass retort* well luted in a close reverberatory furnace; giving fire by degrees till you come to the highest, which continue twenty four hours. Out of one pound of *Nitre* thus distilled, you may have four ounces of Spirit saith Mr. \* *Thibaut*. But Mr. † *Hartman* upon *Crollius*, saith there will come out of those red Spirits, but an ounce and an half or two ounces at most. Having gained this Spirit, ‡ *De Spirit. Sal. Nitri* pag. 133. let him take a pound more of as good *Petre* and burn it with a Coal in a *Crucible* according to the process of Mr. *Boyle*, or *Glauber*: and let him get as much fixed Salt as he can: breaking his *Crucible* into the bargain. I find that Mr. *Boyle* in his account of the redintegration of *Nitre* saith not what quantity of fixed Salt he had: only that he reproduced the *Petre* by pouring the Spirit upon the *Alkali*; and that he did not affuse so much of Spirit upon it, as the *Alkali* seemed to have lost in the burning: and yet not much less. In another place about subordinate formes pag. 350 he saith that *Nitre* upon calcination leaves only a third part, or perhaps more. But let him get what he can (I assure him that the sowler his

\* Art of Chymistry. pag. 33.

† De Spirit. Sal. Nitri pag. 133.

See Mr. Boyle's Experiment About the parts of Nitre Sect. 4.

Glauber de fig.  
nat. Sal. p. 28.  
29.

ubi supra Sect.  
17.

De signate. Sal.  
ubi supra.

*Petre* is, the more he will get) and having dissolved it in *raine-water*, and filtrated it, let him powre upon it the *Spirit of Nitre* drop by drop untill the abullition cease: Then let him with patience expect for some daies, the redintegration of the *Nitre*: or if he be hasty, let him evaporate the liquor away till it come to a cuticle, then place it in a cool place, and in one night he shall find his *Petre* to *Crystallize*: Then powre off the liquor, and evaporate it to a *Cuticle* again, and to a third time till he have gotten all the *Petre*. Having allowed this *Experiment* all the advantages imaginable, which is, that our *Operatour* shall have such a quantity of fixed Salt as will redintegrate exactly his *Petre* ( which may not happen, as I have demonstrated ) so that having calcined one pound: and distilled another into *Spirit* he hath reproduced now one compleat pound of *Petre*: And that this *Petre* is as effectually for *Gurpowder*, as our common *Salt-Petre*: ( which yet is an *Experiment* our *Inventors* and *Improvers* give no account of: Mr, *Boyle* saith his was more acid, then *Salt-Petre* is usually; and what alteration that *Superfluous Spirit* adhering is to the *Crystals* may produce, I know not. *Glauber* proceeds to dissolve again and filtrate his regenerate *Nitre*: and then saith *Quicquid post operationem Superfuerit in arenâ per evaporationem, donec cuticula appareat, rursus distillandum, et in frigore in Crystallos redigendum est, quæ, ut vulgaris Sal-Petre in usum adhiberi possunt.* And saith that if you will again calcine one part, and distill another, and reproduce *Petre*, you shall have more pure *Petre* than ever, and which will perform admirable effects in *Physick* and *Alchymistry*. ) Granting, I say, our *Operator* all this happiness, I desire to know where is the great improvement in the *Art* of making *Salt-Petre*? How much cheaper will this be afforded, then that which is usually sold? How much more Effectually will the powder be which is to be made out of it? Will a *Thimblefull* serve to charge a *Culverin*? Or, if there be requisite as much to the charge as of common powder: will the force be such that Each *Bullet* of a *Culverin*, or *Canon* shall do execution at the *Texel*, *Algiers* or *Candia*? Can you dispatch with a pocket-pistoll from *Arundell house* the boldest *pyrate* within



within the *Straights*? Or, in fine, will this *Powder* last for ever without any decay, and by its *durableness* countervail the charge and Extraordinary trouble in the making? I cannot find a word of *all this*; nor any thing but what will convince any man that to make *Salt-Petre*, is but to lose his time instead of improving the *Manufacture*. I heard that Some of the Society had a great mind to work *Silk* into *Hats*: which project though the *Hatters* laughed at, yet to satisfy them, tryall was made: and for twenty shillings they had a *Hat* made but it proved so bad, that any one might have bought a better for Eighteen pence. I shall do Mr. *Henshaw* a courtesy, and tell people (besides the pretty curiosities observed by Mr. *Boyle*) that with all this trouble, and cost, though they got never the better *Petre*, yet *Glauber* tells you, this is the only way for any man to see the true signature and rightly-shaped crystals of *Nitre*: they will be all as white as Snow, long, slender, *Sexangular*, and so smooth that nothing can seeme more polished; and so discover that signature which God and Nature endowed *Salt-Petre* with. *Si rectè operatus fueris, omnes Crystalli nullis exceptis erunt in longitudinem aequalem directæ, et Sexangulæ sine ullâ asperitate et Scabritie, quæ vera et genuina Salispetræ rectè et probe purgatæ Signatura existit.* And is not this a considerable improvement in the Art of making *Salt-Petre*, to produce such beautiful Crystals, to shew the true figure into which that *Salt* naturally doth Crystallize? Some have represented the natural figure of that *Salt* to be *Cylindricall*: and I have by me some exact and large *Cylinders* into which it did Crystallize, but not from the *Salt-Petre* works: some have ascribed to it other shapes; Mr. *Boyle* found it to be *Sexangular*, but the sides not of equall breadth, and, each two whereof as they were opposite to each other, seemed parallel. *Glauber* faith that their shape will be such as I have described in *English* above, if you follow his way in making them. And is not this a notable discovery for such men as raise their Glory upon the shewing of Sights! Especially, if Mr. *Henshaw* Exhibit them also fistulous! which neither *Glauber* nor Mr. *Boyle* did!

*de signat. Sal.*  
Pag. 29. 30.

Experiment of  
*Nitre* Sect. 5.

Senert. de conf.  
Chym. c. 19. Mr.  
Thibaut Pag.  
59.

The other way of burning Salt-Petre to an *Alkali* with *Brimstone* is ridiculous, and such as any man that ever made *Salprunella* will laugh at. For the *Brimstone* doth not burn the *Nitre* to any *Alcaly* at all, nor inflames it at all, but serves to purifie it by consuming the *Sal-Armoniacall* parts or greasy heterogeneities, and precipitating its feces to the bottom of the pot till it become so transparent, that after those projections, and flagrations you may see the bottom of the pot through the melted *Nitre*. And this is so evident a thing that *Senertus* and *Monsieur Thibaut* are positive therein. *Pietro Sardi* (as you may see hereafter) and *Casimirus Semienowicz* in his *Ars mag. Artiller. p. 1. l. 2. c. 3.* do prescribe this very way of burning it with *Sulphur*, instead of the more tedious refining which is usually practised, in order to the making of *Gun-powder*. “*Imponatur Sal-nitri in*  
“*vas aliquod cupreum vel ferreum, aut fistile vitreatum, et*  
“*igne vasi supposito, perq̃ solitos gradus aucto exuratur, donec*  
“*Sal liquefiat et fervendo bulliat. Iam sumatur aliquantu-*  
“*lum Sulphuris communis subtilissime pulverisati, et Salinitri*  
“*liquefacto superinspergatur: et concipiet subito flammam, et quic-*  
“*quid pinguedinis vel noxij terrestris Salis non sufficienter pur-*  
“*gatus Sal-Nitri habuerit, exuret et multum clarificabit: in-*  
“*jectio autem Sulphuris aliquoties reiterari poterit. Deniq̃ li-*  
“*quefactum et purificatum Salemnitri Effundito in marmor poli-*  
“*tum vel laminas ferreas aut cupreas, vel vascula aliqua*  
“*metallica vel figulnea vitreata, et frigesce ibidem finito. Ha-*  
“*bebis jam Salemnitri congelatum, parium lapidem vel Alaba-*  
“*stritem colore et duritie quam proximè referentem.* If that excellent *Lithuanian* found this to be as good a way to refine the *Nitre*, as that other by new solution, affusion of *Lixiviated liquors*, and new coagulation: If it be evident that *Salprunella* will *Crystalize*, and burn as other *Petre*: if it be certain that *Brimstone* cannot burn *Salt-Petre* (as *Senertus*, *Tartaglia* and *Semienowicz* avow) How shall we do for this fixed *Salt* or *Alkali* wherewith to make *Nitre* by affusion of the *Spirit*?

His calcining of it with *Antimony* hath as little of fence as the former: for besides that there is more trouble in the process



process, because that the *Alcalisate Salt* must be washed from the *Antimony*: which takes off from the *improvement*. If there be any *Alkali* in those preparations of *Diaphoretick Antimony* (wherein every Apothecary tries the Experiment) it is from the *common* or other *Salts* mixed with the *Nitre*, and not from the *Nitre*, part of which flies away with the *Sulphur* of *Antimony* as it *deflagrates*: the rest staves behind, and may be extracted with water, and reduced into *Crystals* of *Nitre*, as a friend of mine tried, of which he keeps some by him. This *Schroder* and *Rolfincius* speaking of *Diaphoretick Antimony*, and its *edulcoration* confess, "*Aqua post primam*  
 "*edulcorationem nitro gravida ad medietatem evaporata prabet*  
 "*egregiam Aquam Anodynam. Eadem justa evaporatione progressa*  
 "*in cellâ subterraneâ locata concrevit in Crystallos, qui Nitrum*  
 "*Anodinum vocatur. A Schrodero LAPIS PRUNEL-*  
 "*LE ANTIMONIALIS indigitatur.*

*Ralsine c. Clyn.*  
*in art. red. act.*  
*l. 5. Sect. 7.*  
*c. 2. pag. 377.*

The *vanity* of *Some men* not knowing when they are well must be trying *new conclusions* although it be for the worse: and obtruding them upon others. What (if at all,) was to be done with plain *coal*, must for *Ostentation-sake*, be tryed with *Brimstone* and *Antimony*. And it had been a more genuine observation to have acquainted the world how; after *Mr. Boyle* had found out a way to reproduce *Nitre* by affusing the *Spirit* to the *Alkali* of *Nitre* burnt with *coal*: *Mr. Henshaw* had found out a method how to reduce the *Alkali* of *Nitre* burnt with *Brimstone* and *Antimony* to *Nitre* without any new *Spirit* affused. Had he pretended this, it had been but an *ingenious imposture* for vulgar capacities: but now there is more of *weakness* than of *knavery* in the performance.

Had he told us out of *Mr. Boyle's Essay*, and especially out of *Glauber*, that the manufacture of *Salt-Petre* might be improved by affusing *Aqua Fortis* or the *Spirit* of *Nitre* upon the solution of *Pot-ashes*, or any *Alcalisate-Salt*; Nay upon *Sal Gemma*, *Bay-Salt*, common table *Salt*; or *Lyme water*, and that thereby any one might gain *Crystals* of *Nitre*, proceeding according to *Glauber*. *Prosper: German. part. 2. pag. 66. Et habebis purum putum Salempetra, instar alius Salis-*

bid pag. 65.

*Petre ex pecorum aut pecudum Stabulis petiti, flammam concipientem.* If he had hold us this, though the advantage would have been greater than by the *Alcali* of *Nitre*; yet would it not have been considerable, because of the *expense* and *Trouble*, and that it must be performed with the *brittle* materialls of *Glasses*, as *Glauber* observes. But it would have illustrated a little what I mentioned about the *Lixivate Salt* in the *Ashes* through which the *Salt-Petre-liquor* is filtrated, shewing how the *Alcali* and *common Salt* are turned into *Petre* by vertue of that *Liquor*, which yet hath nothing of the *Acid Spirit*, whereby the *Chymists* generate theirs. Let us learn from thence how obscure the procedures of *Nature* are! and how different from those of *Art*! And let us leave off to say, that things are alwaies generated of those *principles* into which they are *Ana-*  
*lysed.*

Hist. of the  
R. S. Pag. 275.  
276.

“That which I aim at then is, that if the *Spirit* of the *vo-*  
“*latile Salt* of *Soot*, or of the *Urine*, *blood*, *hoofes*, *hair*, *excre-*  
“*ments* or indeed any part of *Animals* (for all abound with  
“such a *volatile Salt* fixed and *Oile*, as *Petre* doth) could by  
“the same way, or any like it, be reduced to *Petre* or some  
“*Nitrous Salt*, not much differing it from it: it would excel-  
“lently make out a *Theory* that I am much delighted with till  
“I am convinced in it; which is, that the *Salt* which is found  
“in *vegetables* and *Animals*, is but the *Nitre* which is so uni-  
“versally diffused through all the *Elements* (and must  
“therefore make a *chief ingredient* in their *nutriment*, and  
“by consequence of their *Generation*) a little altered from its  
“*first complexion*. And that the reason why *Animals* that  
“feed on *Vegetables* are obliged by nature, to longer *meales*,  
“than those that feed on other *Animals*; is, because *Animals*  
“are fuller of that *Salt* than *Vegetables*: And indeed such  
“*Animals* are but *Caterers* of it for *Man*; and others whom  
“*natures bounty* gratifies with a more *delicious* and *lusty*  
“*Dyet*.

“I confess I have been the more confirmed in this *fancy*,  
“since I have often seen a friend of mine with a natural and  
“*facile* *χρῆσις* convert the greater part of *Petre* into a  
Salt



“ Salt so like the *volatile Salt of Urine*, that they are scarcely  
 “ to be distinguished in smell or taste; and yet he adds no-  
 “ thing to it that can possibly be suspected to participate of  
 “ that nature. But indeed all *volatile Salts* are so alike, that  
 “ it is not easy to distinguish them in any respect.

I have been carefull not to dismember this last *Paragraph*,  
 that the *Reader* might with one view survey this *strange*  
*fancy*: and Judge better how little I impose upon him  
 in the sequell of my discourse.

And first I ask our *Orator*—how he applies this *Speculation*  
 to what he promised us in the introduction to it? *How does*  
*this improve the Art of making Salt-Petre*? If an ill *Memory*,  
 and a proportionate mixture of something else, be demonstra-  
 tions of a great *Witt*, no man hath given greater testimonies  
 of his abilities than Mr. *Henshaw*. Secondly, I demand why  
 He is so *Solicitous* to transform the *Spirit of the volatile Salt of*  
*Soot or Urine &c into Petre*: whereas any man that consid-  
 ered what he went about would employ his care rather to  
 coagulate the *volatile Salt with which the Spirit of Soot and*  
*Urine abounds with Spirit of Nitre, Aqua-fortis or the like*  
*into Petre*; or some such *Nitrous Salt*? But, behold the  
*Happiness* of Mr. *Henshaw's* *Fansy* and the *unhappiness* of  
 his judgment: That which he *Fancied* possible about the  
 coagulation of the *volatile Salt* abounding in *Spirit of*  
*Urine with Spirit of Nitre into a kind of Petre*, this *Experi-*  
*ment* hath happily succeeded under the tryall of the Ho-  
 nourable and inquisitive Mr. *Boyle*: but yet that *Theory* which  
 he goes about to deduce thence is as farr from being esta-  
 blished thereby, as the *Artifice of Salt-Petre-making* is from  
 being thereby advanced! *From Spirit of Urine* (saith Mr.  
*R. B.*) and *Spirit of Nitre*, when I have suffered them to re-  
 main long together before coagulation, and freed the mixture from  
 the *Superfluous moisture* very slowly, I have sometimes obtained  
 fine long *Crystals*, so shaped, that most beholders took them for *Cry-*  
*stalls of Salt-Petre*. But whosoever shal consider how much  
 more trouble and cost there is in distilling those other *vola-*  
*tile Spirits* than there is in the drawing of the *Spirit of Ni-*  
*tre*: and how *small quantities* are like to be made this way,

L

Mr. R. B. Ori-  
 gine of formes  
 Pag. 125.

and

and those perhaps not serviceable in *Gun-powder*, will easily see that this project is as *inutile* as the former was in order to the *improvement of the making Salt-Petre*.

Oh! But it will excellently make out a *Theory*, that the *Salt* which is found in *vegetables and Animals*, is but the *Nitre* which is so universally diffused through all the *Elements*, a little altered from its first complexion. I remember that *Scaliger* taking occasion to complain of *Cardan* for some illogical inferences, useth these words: *Dij benefecerunt, quod te feminam non fecerunt. Ad primam quamq; speciem promissorum exiluisse.* I must apply this *Sarcasme* to *Mr. Henshaw*, who could be deluded by such weak appearances of *reason*. Let us but shape an *Hypotheticall Syllogisme* for him, and consider the consequence.

*De subtil. Ex-  
erc. 153 S. 8. 9.*

If the *Spirit of Nitre* being poured upon the *Spirit of the Volatile Salt of Urine, Soot &c.* doth reduce the *Volatile Salt* to *Petre* or some *Nitrous Salt* not much differing from it; then doth it follow that the *Salt* which is found in *Vegetables and Animals*, is but the *Nitre*, which is so universally diffused through all *Elements* (and must therefore make a chiefe ingredient in their nutrition and generation) a little altered from its first complexion. But the *Antecedent* is true Ergo,

*Origine of  
Formes Pag.  
216.*

In the first place it is evident by the Experiment of *Mr. Boyle*, that even *Sea-Salt* by the affusion of *Spirit of Nitre* may be turned into *Petre*. Nay *Glauber* teacheth us how *Allom, Vitriol, Mineralls* and *Stones* may be with more or less trouble converted into *Nitre*; why did not he extend his consideration about the *Nitre* in all the *Elements*, to them? Is it because that they abound not in *Oile* and *volatile Salt*, upon which he so wisely builds his *Argument*?

*In Append. ad  
quint. part.  
Prosper. Ger-  
man. Pag. 20.  
23, 25, 49.  
Ex 6.*

Secondly since it is made evident by *Glauber* in many places of his works, that the *Spirit of Nitre* is as it were the *Seed of Nitre* by which it propagates it self and assumes a body, as plants do, where it finds one agreeable: and such are not only



only ( nay not principally : which he should have noted ) the volatile but fixed Salts of any Creature? *Aqua fortis, aut Spiritus Nitri, est quasi Semen Salis-Petræ, atq; hanc naturam habet, quando alijs Salibus, sicut semen aliquod vegetabile terræ, mandatur, ut ex ipsis augmentum capiendo, multiplicetur, quemadmodum herbarum semina faciunt.* This Seminall principle in Nitre seemes to have the approbation of Mr. Boyle : and if it be thus, as undoubtedly it is, and that those Salts (whither volatile or fixed) are but the materiall principle, I do not see any more validity in the consequence, than if I should say, because sundry plants grow in the Earth or Water, therefore the Earth or Water were but those plants a little disguised in their complexion.

*Chymista Secp-  
ticius, p. 240,*

In fine, it is so farr from following hereupon, that Salt-Petre disguised is the Chief ingredient of the nutrition and generation of Animals; that it doth not follow, that it is any ingredient at all; but that there is something in those substances mentioned that may be converted into Petre, and is, as an Aristotelian would say, disposed fitly to be the Subject matter of that Forme. For as this Argument is shaped, what I say is as manifest, as that the constitutive parts of the Nitre, are to be the volatile Salt & the Spirit of Nitre: The one thing indifferent to sundry combinations and transmutations, and which hath nothing of the nature of Salt-Petre; but is palpably transmuted; since in the distillation of good Nitre there appears no such thing as volatile Salt: The other it is, that Specifies the predisposed matter, and generates Petre out of it; so much altering the complexion, that the affinity betwixt that volatile Salt and Salt-Petre is no more than betwixt a man and a pumpkin. He talks of the complexion of the Nitre being a little altered: but I would faine know how little that is. Let me see the like Crystalls: a resembling flame, and other effects that result from the being and Specification of Salt-Petre. If Salt-petre be a chief ingredient in the generation and nutrition of vegetables, 'Tis either because of its bulke or Efficacy that it is chief; but neither of these is true: For the quantity is not so great in vegetables or Animals, should we allow the volatile Salt and Nitre to be all

one. Not for Efficacy, because it is not made out that there is *Nitre* in the *Sea*, in *clay-grounds* or *Springs*, or in *Countries* remote from the *Sun*; yet here *fishes* and other *Creatures* feed, and *plants* grow: and consequently that cannot be a *chief ingredient* in *nutrition*, which may be wanting.

There is something else in *Mr Henshaw* that looks like an Argument by the introduction *FOR*. — For all abound with such a *volatile Salt* fixed, and *Oil*, as *Petre* doth. I cannot tell how to forme this Argument, and yet convince the world that I do not injure him, this passage is so extremely ridiculous. Yet I will endeavour it, if it be but to shew the *Logick* of *Ant'-Aristotelians*, and how much we owe to that *providence* which hath educated us better than to argue so. The proposition he aims at, and would prove is, That the *Salt* which is in *vegetables*, and *Animals*, is but the *Nitre* which is universally diffused through the *Elements*. The medium or Argument by which he would prove it is — is — is — harder to be found out than the meaning of *Aristotle* in his *Acromaticks*. Let us consider it again.

“That which I aim at then is, That if the *Spirit* of the  
 “*volatile Salt* of *Soot*, or of the *Urin*, *blood*, *hornes*, *hoofes*,  
 “*haire*, *excrements*, or indeed any part of *Animals* ( for  
 “all abound with such a *volatile Salt* fixed, and *Oile* as  
 “*Petre* doth ) could by the same way ( viz: as the redinte-  
 “grated *Nitre* ) be reduced to *Petre*, or some *Nitrous Salt*,  
 “it would Excellently make out a *Theory* that I am much  
 “delighted with, till I am convinced in it: which is, that  
 “the *Salt* which is found in *vegetables* and *Animals*, is but  
 “the *Nitre* which is so universally diffused through all the  
 “*Elements* ( and must therefore make a *chief ingredient* in  
 “their *nutrition*, and by consequence of their *generation* )  
 “a little altered from its first complexion.

By his Favour-cc  
 there is no  
 consequence in  
 that passage:  
 if it be the  
 chief ingredient  
 in nutrition, 'tis  
 so in generation:  
 for though nu-  
 trition be com-  
 monly by a new  
 generation of

Here is the *Spirit* of the *volatile Salt* of the parts of  
*vegetables* and *Animals*, to be coagulated and transformed  
 into *Petre* by the *Spirit* of *Nitre*. — Here is a *volatile*  
*Salt* fixed, and *Oile* such as is in *Petre*! mentioned to what  
 parts: yet in that which is properly generation, the *Seminal* principles and *active* are chief  
 in *nutrition*; the *materiall* and *passive* principles are more regarded.

purpose



purpose! — Here is a *Salt* spoken of to be found in *Vegetables*, and *Animals*: yet 'tis not expressed whether it be the *volatile* or *fixed Salt*: yet these two are different, and those that abound with *volatile Salt* are more the *Physick*, than the food of man. — Well I have spent half an hour to frame a *Sorites*, or any tolerable *Argument* out of these words: but I cannot do it: but I will adventure to give our *Philosophers* this advise that they would take our *English* word *F O R* into their serious consideration, and abolish the use of it, as the *French Academy* at *Paris* did *Car*. Before I have done with this *History*, I shall shew that this *Intimation* was but necessary for them.

To proceed: How doth it appear that *Salt-Petre* abounds with a *volatile Salt* fixed and *Oile*? In the regenerated *Nitre* (which *Glauber* makes to be the best) there is nothing but *Alkali* and the *Spirit of Nitre*: in the *Nitre* which is generated by the mixture of the *Spirit of Urin* and *Spirit of Nitre* there is no such thing. In the distillation of *Nitre* there is nothing but *Spirit* (inseparate from *Phlegme*) and its *Alkali*: and as there is no *Oile* there, so I hope he would not have us take the *Alkali* for a *volatile Salt* fixed. In the making of *Salt-Petre* there is found indeed something that seems *Oily* and *greasy*: but that is *Excrementitious*, and so farr from being a *constitutive* part of it, that it must be *Separated* from it (as *Mr. Henshaw* knowes) before *Salt-Petre* can be made: and the great contrivance is how to separate it. So *Glauber* in *Prosper German.* part. 3. pag. 43. *alias enim pinguedinem nimiam contrahit lixivium, nec ullum Sal generabitur.*

From the mention of this *Oile*, I must take an occasion to tell the world how superficially our *Virtuoso* writes the *History of Nitre*: I could suggest many *curiosities* from the severall *liquors* in the making of *Salt-Petre*: But I have not time to discourse of the *Mothers of Petre*, nor how that *grease* being lodged in the *ashes*, those *ashes* being exposed to the Sun at *Warwick* did in one or two daies produce visible *Nitre* on the top of the *ashes*, so that in few daies those *ashes* become fit to be *Elixiviated* into raw *liquors*, which were before but to make a *Lixivium* to

purge the *liquors* that had boiled. I shall only touch at an Experiment which may not be unwelcome to the Honourable Mr. Boyle. I took of the *Mothers* that had stood long and were exceeding *Oily* : I powred four spoonfulls of them into a large *Venice-glass*, half full of water : This *greasy liquor* funke to the bottom instantly without altering the *tast* or *colour* of the water at all : so that the top was *clear water* ; the bottom of a *reddish colour* as *bilious Urin* : only on the surface of the water, and in the middle, there did float several very small *bubbles* of the colour of water : having let this stand a day : I took a Solution of the *Alkali of Salt-Petre* (which, though of a *greenish blew*, yeilded a *lympid liquor* upon *filtration* ) and poured two or three spoonfulls into the mix-

\* After the *Glass* had stood some daies, the liquor lost its *Oiliness*, no *Crystals* did shoot at all, but it became a little *turbid* on the top there floated something here and there, like to a thin *cremor*, and on every side of the *Glass* from the top to the bottom thereof fixed themselves certain *molecules* which a credulous *Chymist* would as firmly have beleived to have been the *rudiments* of some plants, as that the *Salt of Harts-hornes* in distillation represents the *horns* of *Staggs* ; If you will imagine any Plant growing on the side of a wall, and that instead of the leaves of the plant, there were nothing but white *filaments* issuing from a root, such were these : all of them were of one bigness, and were ranked in some order. A chance hindered me from making further inquiries : nor indeed am I sollicitous about them.

The Phenomenon appears not if you look down right on it, but standing on one side at a distance.

ture of *Mothers* and water : immediately the whole liquor turn'd *Lacteous* or *white* ; but the colour presently contracted it self into a white *emacorema*, or *suspensum*, such as is to be seen in *healthfull Urin*, and so floated above the surface of the *Mothers* : the next morning I found as it were a powder fallen to the bottom, which I stirred up to the top, whereupon the whole liquor up to the top of the water was *turbid*. \* I let it stand all night, and this morning the whole liquor from top to bottom is of one colour ; and that exactly of a *Limon-colour*, or like old *Hoccomar-wine* ; on the top there seems to float thin *coagulations* of fat with some variety of colours, such as one may often see on small waters that stand in *Moorish* grounds : the liquor is nothing nigh so *acrimonious* and *purigent* as the *Mothers* were : and all of it is as *greasy* as the *Mothers* were, when *Separate* : hanging on the finger, as *Oile*, and not like water at all ; at the bottom of the *Glass* there lies a *Yellow-sediment* as 'twere powder, which upon agitation will not rise of it self, but must be stirred up with something,

and



and then resembles the white *Hypostasis* of *Urin*, with *capillary filaments* enterveaving each other.

And, How doth it appear that *Urin* doth abound with a *volatile Salt fixed*, and *Oile*? I do not understand what he means by his *volatile Salt fixed*: by what is it fixed? to what degree? *volatile Salts* are sometimes so fixed, as only to abate, not alter the *volatility*: as the *volatile Salt* of *vipers*, in *Zwelfer*: and the *volatile salt* of *Harts-horn* (of which I keep some) with rectified *Spirit of Salt*: Sometimes they are so fixed as to loose the nature of *Salt* and to become *insipid*, and *indissoluble*: as when *volatile Salts* are mixed with *Lime-water*: There are a sort of *Salts* which *Zwelfer* calls *Salia Essentialia*, which are not to be called properly fixed, nor *volatile*, being *media quasi naturæ inter utraq; Salia*, *volatilia Scilicet*, (*quæ instar Spirituum levi ignis calore concitata sublimantur*) et *fixa*.

*Zwelfer. in Pharmicop: Aug: pag. 486. Edit. in 8.*

*Ibid. pag. 234.*

And there are *Salts* so fixed naturally that they will endure the *Fire* without evaporating: such are *Alcalisate Salts*, being purely *Salt fixed*: other fixed *Salts* having of *acidity* in them, and upon *distillation* yeild an *acid Spirit*: how farr these may be *volatilised*, is not the question; but whether there be in *Urina* a *volatile Salt fixed* which any man will deny, who considers with how much ease the *volatile Salt* of *Urin* is procured. As for the *Oile* wherewith *Urin* is said to abound, surely Mr *Henshaw* converses with men of a strange kidney that make such water; Or that feed much upon green *Tortoyes*. In some morbid persons Physicians speak of *Urines* that are *oleaginous*, *ἐλαίωχρα, ἐλαίωφάνη, ἐλαίωδη*. But I shall favour the *Virtuoso* so much as to understand what he saies about *Urin*, as relating to persons in health, and not sick; least I should be to seek as much for the *volatile Salt* as I am for the *Oile*, which is not to be distilled from it by any *Chymicall* process, that I meet with in Dr. *Willis*, or any else: nor to be seen, but in such as feed on green *Turtle* in the *West Indies*: or are not well in their bodies: not be spoken of, but by such as are not well in their wits. If by *Oile* he means that which gives a colour to the *Urin*, and is by Dr. *Willis* called the *Sulphureous* part of the *Urin*: I shall not now dispute

*Zwelfer. in Append. pag. 99. Salia purè Salsa fixa. Salia, acciao. Salia fixa.*

*Vid. Zwelfer in Append. pag. 99.*

whether that be *Oile* : or, no since that same learned and in-  
 quisitive person assures us he found no great quantity of it in his  
*Analyfis. Urina Anatome ostendit quod Elementa e quibus liquor*  
*eius constatur sunt plurimum aqua et Salis, aliquantulum Sulphuris*  
*et terra, atq; Spiritus tantillum.*

Willis de uri-  
 nis c. I.

Yet a word, or two : How doth it appear that *Nitre* is so  
 universally diffused through all the Elements ? If he mean the  
 Aristotelian Elements, did he ever find it so universally lod-  
 ged in that *Fire* : is it so diffused through *water* ? how many  
 foot deep is it found in the *Earth* ? How doth it appear to be  
 in the *Aire* ? Let Mr. Henshaw recollect himself. Let him  
 give what *Notion* he will to his Elements, the Assertion is  
 false : although it be true that in this Terr-aqueous Globe of  
 ours there is nothing occurs but what contains in it Salt-  
 Petre, or somewhat that may first or last, after greater or

Glauber. Prof-  
 per. German.  
 part. I. Pag.  
 98. 99.

lesser pains and time be Animated into Salt-Petre viz. "Ex-  
 emplum hoc esto. Sal Vegetabilium, Animalium, et Mineralium  
 Essentialis vel Universalis sua natura quidem nitrosus  
 est, sed prius flammam non concipit, quam ex aere vitam et  
 flammam attraxerit. Salium autem etiam unus citius et libentius  
 altero, vitam illam attrahit, prout a Natura formatus est.  
 Quod fugaciores et magis urinosi sunt sales, eo citius in Nitrum  
 se commutant: quo mordaciores et magis corrosivi, eo difficilius  
 et tardius Salispetrae naturam induunt. Sed quia Nitrum  
 Sal est utriusque naturae particeps, urinosum nimirum et corrosivum,  
 et quasi ex utroque Sale urinoso nempe et corrosivo compositus,  
 ejus ope peritus Natura Salibus facile succurret, et ex iis faciet  
 quicquid voluerit. Nec Sal ullus est in rerum natura qui  
 artis adjumento in Nitrum mutari nequeat: Inprimis vero  
 sales illi, qui igne sublimantur et ejus vi elevati ascendunt:  
 ut illi qui in urina et excrementis animalium omnium sunt:  
 Imo animalia, vegetabilia, et Mineralia ipsa, facile ad-  
 modum Nitri naturam arripiunt. Hic primus Salium gradus  
 esto. Alter gradus est Salium, qui aliquanto fixiores sunt, ut artis  
 filii nuncupant, et in igne a vegetabilibus, animalibus et mine-  
 ralibus relinquuntur. Hi difficilius in Nitri naturam transeunt.

It is to be no-  
 red, that al-  
 though he say  
 Sea-Salt and  
 some others do  
 require much  
 time to be con-  
 verted into Pe-  
 tre: he means  
 when it is to  
 be as it were so-  
 wed & planted,  
 & generated by  
 a Seminal fer-  
 mentation;

otherwise, he  
 knew, and teacheth speedy waies of generating Nitre out of the fixed-Salt of Lyme-stone as doth Mr.  
 Boyle out of Br.-Salt in his Origine of formes pag: 216.

Omnium



“*Omnium difficillime illi, qui in tertio gradu sunt, ut Sal communis, marinus, montanus seu fossilis, alumen et vitriolum. Nam hos ars etiam eò deducit, ut in verum Nitrum abeat, sed difficilium, cum longiore ad eos mutandos tempore indigeat, quam ad supranominatos Sales fugaces, volatiles et urinosos. Quare nemo eò opinione esto, quando in Scriptis meis dico quod hic aut ille Sal, in Salem-petra converti queat; quamprimum lixivio extractus, aut saltem ignis calcinatione elicitus fuerit, quod Sal-petræ verus et ardens futurus sit: Tempus adhuc requiritur, quo ex aere vitam et animam, alliciat et ardens evadat.*

*Lippis et torsoribus notum est, maximam Salis-petræ antehac confecti partem, ex lixivio terræ, ex ovilibus, aliarumq; bestiarum Stabulis antiquis petita, excœtam fuisse. Quare ex antiquis jumentorum, pecudum et pecorum Stabulis, et non etiam novis? Ideo quia non solum vetera Stabula longo temporis progressu plus ex excrementis et urinâ Salis imbibunt, eâq; de causâ plus Salis-Petræ conferre possunt. Sed etiam Sales ipsi Excrementorum ex animalibus, quod potissimum est, longo temporis progressu ex aere animam suam acceperunt, quâ recentes nondum imbutisunt. Nam, coquat quis, torreat et vexet stercora, et urinam animalium, ut voluerit, Nitrum nunquam evadent, nisi ex aere vitam suam hauserint.*

Whereas he saies, “That the reason why Animals that feed on Vegetables are obliged by Nature to longer meales than those that feed on other Animalls; is because that Animals are fuller of that Salt than Vegetables: and indeed such Animals are but Caterers of it for man and others whom nature gratifies with a more lussy and delicious dyer. — To begin with the last passage, I observe that our Inventor hath such a Pique against Antiquity, that he transgresseth the old proverbe *De gustibus non est disputandum*. It doth not appear to me certain that the feeding upon Flesh, as most do now: or on Fish, as most did heretofore; is more delicious than to feed on vegetables, and some of their productions. Nor yet that it is the more lussy food, Zacchias in quest. medico-legali. 7. Tit. 1. qu. 2. give the word what sence you will. The story of Daniel’s pulse: of St John Baptist, of the Negro’s in the West-Indies, of

the Bannjans in the East-Indies. They will not grant it who hold ( I think most truly ) that before the flood men lived on Vegetables : In the Golden age they are not fancied to have had this delicious and lusty food.

Ovid. meta-  
morph. l. 15.

*At vetus illa atas cui fecimus Aurea nomen  
Fatibus arboreis, et quas humus educat herbis  
Fortunata fuit, nec polluit ora cruore.*

Renatus Moreau  
in animadv. ad-  
Schol. Salernit.  
pag. 590.

Arn : de villæ  
Nova de usu  
carnium pro  
sustent ord.  
Cartusienf.

1 Sam : 30. II.  
12.

Zacchias, quest  
medico-legal. l.  
5, tit 1. qu. 2.

How many of the Ancient Philosophers did decline & de-  
cline this admired dyet ? but our Virtuoso will as little approve of  
their Palats, as their judgments. How many of the primitive  
Christians were of the same judgment, and liv'd accordingly ?  
They were so universally inclined to it ( I do not mention  
the Tatiani and Encratita, and other Hereticks ) that in the  
Examination of such as were to be admitted into Holy Or-  
ders it was one Query, *Si nuptias Secundas non improbarent,*  
*et carnes non haberent Execratas. Quin cogebantur prægustare*  
*carnes, alioquin Excommunicabantur, et de ordine sui Clericatus*  
*deponerentur, ut habes expositum in Can: 50 51. Apostolorum.*  
*1 Can. 14. Carthagenensi, canone primo. Bracharensi primo,*  
*et refertur de consecrati dist. 23. cap. qui Episcop.* The order  
of the Carthusian Monks at present eat no Flesh: yet doth  
Arnoldus Villanovanus demand, *Quis audeat asserere quod nemo*  
*vite longitudinem consequatur sine carnum usu, cum in Monaste-*  
*riis Cartusienses octogenarii et centenarii mundorum sensuum*  
*crebro inveniantur.* When David found the Egyptian in  
the field, who had eaten no bread, nor drank any water  
three daies and three nights : they gave him bread and he did  
eat, and they made him drink water : And they gave him a piece  
of a cake of Figs, and two clusters of Rayfins : and when he had  
eaten, his Spirit came again unto him. And it seemes as if  
the general food of the Romans had been Herbs : So Zacchias  
imagineth, *Quibus ego addam Claudii Edictum, de quo apud*  
*Suetonium in ejus vita cap. 22. quo cavebatur ne in propinis*  
*quicquam costi veniret, præter olera et legumina : quæ quidem*  
*non contemnendam conjecturam præbent antiquiores, hæc præ cate-*  
*ris cibariis in familiarissimo usu habuisse ; Est et apud Horatium*  
locus



*locus ex quo similis conjectura desumi potest, cum suum vitium familiarem ac quotidianum narrat: l. 1. Sermon. Sat. 6.*

————— *Inde domum me*  
*Ad Porri, et Ciceris refero, Lagamq; catinum.*

I neither find that these people *disrelished their dyet*, or wanted of that *lustiness* which the eaters of *flesh* pretend unto. That such as feed on *Vegetables* should be *Caterers of Nitre* for those that feed upon *Animals*, it is either *false*, or they are very bad *Caterers*, since they seldom do their duty in procuring that *Salt*: and when by chance they may have fed upon any, I am confident it is transmuted into an *Urinous Salt* in their bodies, so that those other *Animals* never get any other than that *universall Salt* which is the *radix Nitri* as *Glauber* calls it, but is really no more *Salt-Petre* than it is *Salt Armoniack*; *Salt of Wormwood*, or *Salt of Scurvy-grass*. No complexion was ever so altered by being *Sunburnt*, or by the *Small Pox*, as the complexion of *Salt-Petre* is in *Plants* and *Animals*, from what it is at the *Work-house*.

“The reason why *Animals* that feed on *Vegetables* are “obliged by Nature to longer meales than those that feed “on other *Animals*; is because *Animals* are fuller of “that *Salt* than *Vegetables*. — This Reason puts me in mind of a problem in *Aristotle*, Why *Colts* that have seen a *Wolf*, are *Swifter* than those that have not? (I think it is to that purpose.) After sundry reasons given, he adds; But perhaps there is no such thing. I profess I do imagine it is so in this case. And waving the question How nature obligeth them to it? I never heard that those *Encratites* and such as *Daniel*, or *St. John Baptist* &c. had *Stomachs* and did eat like *Horses*: I never read of the long meales of the *Bannians*, or *Pythagoreans*. Any planter in *Barbados*, will assure you that a pint of a kind of bean which they call *Bona-vist* with a little *Salt*, boyld, will nourish and support a servant more than *flesh*. The like we observe with *Cacao* in *Jamaica*. The *Hunters* in *Jamaica* that live on *Flesh* and *Salt* when they are abroad in the *Woods*, eat much more in quantity than when they

eat bread, Cassavi, or Patata's with their meat. Besides, there is a bird in *Jamaica*, and the adjacent *Islands* almost as big as a *Turkey* and like one, they call it a *Carrion Crow*, these devour all the offall of the beasts that are slain by the *Hunters*: they are never fat, nor satiated: I have seen some of them feed on *Carrion* from morning to night without any considerable intermission.

That facile *Evxepia* by which his friend did convert the greatest part of *Petre* into a Salt so like the volatile Salt of *Urine* that they are scarce to be distinguished by smell or taste: yet adding nothing that can possibly be suspected of that nature. If it be true, and that Mr. *Henshaw* was not imposed upon; if this *Nitre* was so changed as that it lost its inflammability and way of burning, its way of Crystallising and those other qualities which are proper to *Nitre*: how facile soever the Operation were, it was a transmutation, and the change was greater than when the Complexion of Salt-Petre is only altered a little.

I am tyred with multiplying reflexions upon such a discourse: any one will apprehend that this great and usefull Speculation of Mr. *Henshaw*'s amounts to no more than wast Paper. All that I have benefited by it, is to remember a proposition made in Mr. *Hartlib*, concerning the improvement of Houses of Office, which I will set down as being more materiall to the publick, and indeed more conducing to illustrate his Speculations than any thing he hath alledged.

Hartlib's legacy  
Pag. 180.

I have seen Fifty pounds worth of Salt Petre extracted out of a vault at *Dowgate*, not very Spacious, which was formerly an House of Office, and not emptied till the matter was thoroughly rotten. Why may not the same thing be done by Art, which was formerly done by Nature and Accident? I have been credibly informed that such a work is ordinarily done in the Kingdome of *China* and also at the City of *Paris* in *France*: and I see no reason why English-men should not have as much wit as they. If any man hath convenient Room to build two Houses of Office, and to close up the one whilest he useth the other, then there can be no question but that instead of the charge of emptying, and noysomeness of smell, he may have it emptied for nothing, and  
feel



feel the sweet smell of money very gratefull to most men, and that in as great or greater quantity than he receiveth for his ordinary edifices: besides that, he will shew himself to be a good member of the body politick in which he lives: but he must beware that the matter lye dry, and that no adventitious moisture come to it from beneath or above; which will be something more chargeable in moist grounds than where the Earth is very dry by its own nature. Agreeable to this is the practise of our Salt-Petre-men, who as often as they meet with any old vault of this kind, they make use of it to extract their Minerall, as being inferior to no Earths. And Baccius relates that near a certain town, which he calls *Oppidum Fabrianum*, there was a deep and close Grott under the Appennine, in which Millions of Owles did lodge themselves, their dung had been accumulated there for many centuries of years: out of this the Salt-Petre-men extracted so much of Nitre as amounted to an inestimable summe of money.

And not long agoe, whereas in the Warrs betwixt the *Erim Tartar* and *Polonians* towards *Muscovy*, great numbers of people being slain in battails were buryed for hast together in great cavernes in the Mountains, & so rotted there: out of that Earth in the Cavernes there was extracted a great quantity of Salt-Petre. From these premises, and from the consideration of the dung of *Kine*, *Horses*, *Goates*, *Swine*, *Sheep*; out of all which Salt-Petre is extracted in great quantities, it seems as if one might with some *Speciousness* argue, that the Salt in *Animals* ( which is a great ingredient in their nutrition ) were nothing but Nitre altered a little from its first complexion. But whosoever shall consider with *Glauber* that circumstance of a long putrifaction, and how necessary it is the Earth be *Animated* and impregnated by the *Aire* ( so that in Churches where it is paved, they look not for Petre but in open floores or Seats that are loosely boarded ) and by what degrees and rudiments it proceeds to common Salt ( as I suppose in this case the immature Earth abounds with that which is afterwards turn'd into Nitre, and the Northern Countries that yield little Petre are impregnated with that Salt ) to common Salt first ( except a powerfull Seminality intervene

*Anivas Baccius de therm. l. 5 cap. 7.*

*So Kircher. Mund. Subter. l. 6. Sect. 2. cap. 4.*

*Glauber. Prosper. Germ. part. per. pag. 96.*

*Casimir Semicornic, art. mag. artiller. p. 1. l. 2. c. 2.*

as in ashes, impregnated with *Mothers*; in Earth mixed with the *Scumme* or *ashes* aforesaid) and after into *Salt-Petre*. Whosoever shall consider this will be apt to reject that *conclusion*, and think that since no *Chymistry*, nor other *Artifice* can discover any *Petre* in *Animals* at first, that whatever *Salt* there is in *Animals* and their *excrements*, it more differs from *Salt-Petre*, than the change of its *Complexion* amounts unto, and that it is a kind of *Seminall principle* derived from the *Aire*, or some other way, that generates by *real transmutation* the *Salt-Petre* out of the *volatile* and *fixed Salts*, and ( perhaps ) other particles of their bodies and *Excrements*.

I should here conclude my *Animadversions* upon this *History of Salt-Petre*, but that I think it necessary to shew the world what a *Plagiary* this *Virtuoso* is: This *Theory* of his with which he seems so much delighted, is but a disguise of what *Glauber* hath published in his works, and inculcated more than once. That *inquisitive* person tell us, that there is a certain *universall Salt* diffused through all parts of our *Globe*, and that the three Kingdomes, *Vegetable*, *Animal*, and *Mineral* are impregnated *therewith*: and that this *Universal Salt* is of such a nature that if it be *animated* ( 'tis his own word ) by a certain *Nitrous principle*, *Spirit* or *Seminality*, it will become *true* and *inflameable Petre*. That this *Nitrous Spirit* can never be *incorporated* or *coagulated* of it self: but that it must be *Sociated* with some *Saline bodies* and then it becomes perfect *Nitre*. And however he allowes a regard to the *volatile* and *Urinous Salts* as things most facile to *impregnate* with and *transmute* into *Salt-Petre*; yet doth he ascribe as much to the *fixed* ( though the progress be sometimes slower ) as to the *Volatile Salts* in this case. *Equidem lubens fateor,, quod Spiritus Nitri ex omnibus fixis Salibus sibi corpus assumendo, ad pristinam Salis-Petræ naturam reverti possit.* From this opinion of *Glauber* ( who sometimes speaks loosely, and calls the *Salt* in *Vegetables*, and *Animals*, and *Minerals Nitrous*, and even *Nitre* ) did Mr. *Henshaw* borrow his *Notion* of this *Nitre* that is diffused through all the *Elements*, and disguised in *Vegetables*,  
and

Glauber. appen.  
qu. part. Prof-  
per. German.  
Pag. 23.



and *Animals* and *Minerals*, which he omits; foolishly !)

*Animalia nulla sibi alia quærunt alimenta, quam quæ terra ipsis suppeditat, quibus Sal-petræ omnino adesse debet.* Salpætræ Prosper. Germ. man. part. 3. itaq; est omnium vegetabilium Mineralium et Animalium pag. 112.

*Unicus Servator.* — *Sal essentielle vel naturæ nihil aliud est quam Salpætræ, non tamen ardens nisi animatus fuerit per aërem, et ex eodem vitam aut esse suum hauserit.* — *Cupèta hæc in omnibus rebus nitrum OCCULTUM latere satis superq;* Prosper. Germ. man. part. 2 p. 66.

*arguunt. Sal enim mundi, sive Sal Universale et essentielle nihil est aliud quam Nitrum postquam Vitam ex aëre extraxit.*

What *Glauber's* Opinion is may be guessed out of what I have already alledged out of him, where he particularly explains himself. How — our *Virtuoso* hath disguised and declared his, I have also shewed. But perhaps you will say that Mr. *Henshaw* never read *Glauber*, at least he never takes notice of him: I answer, that in not mentioning of him he shews his *disingenuity*: but *Glauber's* treatises relating to *Salt-Petre* were published in the years 1656, and 1659. And that Mr. *Henshaw* did read him it seems evident from this, that his *History of Salt-Petre* seems rather to be transcribed from out of *Glauber's* third part of the *Prosperity of Germany* (who transcribed it out of *Lazarus Ercker* overseer of the *Emperor's Mines*) than from any *Experiments* or *observations* of his own and other *Salt-Petre-men*, (with whom perhaps he lightly discoursed) whatever he pretended the beginning of his *History*: pag. 261. For had he minded the work, he could not have committed so many *Errours*. I believe that I ought to rectify Mr. *Henshaw's* computation of what *Petre* the liquor holds by computation before it be put into the *Ash-tubs* pag: 270. and that for thirty five pound it ought to be twenty five pound: for so 'tis in *Ercker*; who followes that way of calculating, which I believe our *Petre-men* do not. Sure I am, that whereas Mr. *Henshaw* saith that the liquor of the second boyling when it is ready to *CrySTALLIZE* contains in every hundred-weight about threescore and ten pounds of *Petre*. That *Ercker* saith: *Liquore sic perfecte parato, ex centenaria ejus plus quam 70 l. Salis-Petræ provenient.* That *Signe* also of second boyling being boyld to a

just height, by hanging like Oile on the Scummer, as false as it is, is out of *Ercker*, viz. *Ligula ipsa liquoris bonitatem denotat, ubi liquori immissa et iterum extracta ipsum inftar olei sibi adhaerentem exhibet.* Several other passages there are, which seeme taken out of *Ercker*, about the colour of the *Un-refined Petre*, and the mistake about the *Mother*, or liquor which remains after *coagulation* how it is to be disposed of. The casting in of *Vinegar*, a pint at a time, and the rising of the black *Scumme* (pag 273) is the one a direction, the other an observation of *Erckers*. The Casting in of quick-lime to make the *Petre whiter*, and rock the better; the injecting of burnt *Allome* before that: are the documents of *Ercker*, but not that I hear the practice of *England*. The covering the *Trayes* with cloaths, to make the *Petre* begin to shoot at the bottom and Rock into *fatter Crystals*; These and many other circumstances convince me that *Mr. Henshaw* stole his narrative, and then certainly fetcht his ——— from no other place. Onely he Spoiles a plausible *Theory*, and tells us he is much delighted with it: and no doubt thereof: So were some of the *Society*, and it was an Extraordinary apprehension they had of the worth of this *History* that they inserted it into *Mr. Sprat's Book*: and truly I was as much pleased thereat, as *They* could be.

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Animad-



# Animadversions upon the History of making of Gun-powder, written also by Mr. Henshaw.

Pag. 277.

**I**F some of our Wits were not such Enemies to Logic (a part whereof is Method) I should have expected to have found in the continuation of the History of Gun-powder some mention of Brimston, and its refining. And I should have expected a discourse concerning *mute powder*, which however it be not efficacious, yet is it a sort of Gun-powder, and a noble experiment. And perhaps it might not have been unworthy the curiosity of an accurate Historian to have treated of those preparations of Gold and Steel, which are called *Au-*

*rum fulminans et tonitruans* or *crepitans*, *Ceraunochrysos*; *Mars* *Vide Chrysosco-*  
*tonans*: and that other made with common Sulphur, and *pion Casparis.*  
published by Rolfincius Chym. in art. red. l. 5. Sect. 2. c. *Ambour cap. 5.*  
28. These he might very well have inserted, and neither *Seant. de coaf.*  
have *Invented* over again (a thing usuall with our *Virtuosi*) or *et diss. chym.*  
have related them as *secrets* imparted unto him by an *ingenious friend* or Member of the Royal Society: which is agreeable to their practice: thus particularly Mr. Hooke suggests unto us the usual Study of the Signatures of Plants upon the observation of an able Physitian, a friend of his whereas that discovery is as old as Paracelsus and Crollius and in reference to his insinuation of the vertue of Poppyes from the Signature, I shall add this digressing passage out of Conringius in addend. *micrograph. ob-*  
*ad. med. Hermet. pag. 400. Nec verò capiti prodest vel nymphae*  
*flos uel papaveris caput, quòd imaginem aliquam capitis praebeant:*  
*omnibus enim ejus affectibus deberent prodesse et solis, siquidem*  
*agant Specificà quadam, ut loquuntur, facultate, et capiti*  
*proprie sint dicata. Sed et illa capitis effigiem non aliter prae se*  
*ferunt*

N

ferunt quam poma omnia imo omnes seminum folliculi, quæ tamen nemo duxerit capiti singulariter prodesse. In finitis exemplis vanitatem doctrinæ ostendere est, si opus fuerit.

But these are not his only omissions; for it became him in the first place to have represented unto us the facile and less artificiall waies of making Gun-powder, & then the more elaborate procedure at the Powder-mills. But our Virtuoso is above those pedanticall rules of Logick and History, by which vulgar wits are regulated. Because I think it no unnecessary instruction, I shall set down a Method of making Gun-powder without any Mill at all, as Casimirus Semienowicz reports it. "many of our Country-peasants know how to make Gun-powder without the use of any artifice or machines. For we have seen many of the inhabitants of Podolia and Ukraïn, who are termed Cosacs making Gun-powder after another manner then is commonly practised. They take certain proportions of Salt-Petre, Brimstone, and Coal, (which proportions they have learned by long practise) & put them into an earthen vessel, adding thereto some fresh water, they boile it over a slow fire for two or three houres, till the water be evaporated, and the materials grow thick and Stiffe. Then they take the mess out of the por, and drying it a little more in a Stove or in the Sun, they pass it through an haire sieve, and so granulate it very small. Others take the materials designed for Gun-powder & either upon a plain polished Stone, or in any Earthen Vessel grind them and mixe them well together and incorporate them: then they moisten it, and so granulate it. Betwixt this way of the Cosacs, and that of Vannuccio Biringoccio there is a little difference, which makes me set his down apart. Having weighed the materials, each by it self, and having beat and searfed them each apart, in the end (as the best and speediest way) to compose them together, take the quantity of Nitre you are to use, and put into a Caldron with so much water as, putting it on the fire to heat, you think will dissolve it; then take off the Caldron and set it on the ground in a firme place, and then put in the quantity of

in Art. mayn.  
Artiller. part.  
2. l. 2. c. 14.



“of the *Coal* by little and little, stirring it about untill it  
 “is well incorporated with the dissolved *Nitre*: then take  
 “your *Sulphur* finely powdered and searfed, and stir it in,  
 “stirring it continually about with a wooden pestell, un-  
 “till you have well incorporated all together, and made  
 “the *Coal* fine and impalpable, if you can: then dry it from  
 “all moisture and searfe it very well thorough a fit serfe;  
 “and then wet it with a little common water, or a little  
 “Vinegar, and lastly thorough a sieve or searfe grain it,  
 “and then again dry it well for your use.

“To pass by his defects it is a notorious untruth with  
 “which he begins his History. The materials of Gun-  
 “powder are *Salt-Petre*, *Brimstone*, and *Coal*. — The *Coal*  
 “MUST be *Withy* and *Alder* equal parts: for *Withy*  
 “alone is counted too soft, and some do commend  
 “*Hazle* to be as good as the other two. — I find that  
 those that made Gunpowder at *Coventry* during the late  
 Wars used any light-wood-coal, as *Maple* and *Aspe*: and  
 thought their powder as good as any could be. Some have told  
 me that they have known *Birch-coal* very good. I find *Botallus*  
 to reckon up as ingredients promiscuously used in the ma-  
 king of Gunpowder, *Carbones Cannabinos*, *saliceos*, vel *juglandeos*.  
 and *Semienowicz* saith that if you cannot get enough of  
*Withy*, or *Hazle* to charre: “*Si Salicis et coryli sufficiens non*  
*detur copia ad urendos carbones, vices horum tilia sicca sup-*  
*plere poterit. Si exiguam aliquam carbonum portionem prae-*  
*parare cupis, virgulta ex coryla et salice, vel lignum tilia aut*  
*janiperi in parva frustula secta, et optimè siccata vasi alicui*  
*testaceo includito, et operculo figulneâ cretâ ad orificium vasis*  
*firmato, postea candentibus undique stipatum prunis, per unius*  
*horæ spatium ibidem in uno continuo et equali semper caloris*  
*gradu manere finito. Frigescant tandem sua sponte, et usli eximan-*  
*tur carbones. Sunt qui mappas et lineam telam vetustam bene*  
*et siccata hoc modo in carbonem redigant; cujus etiam non*  
*spernenda virtus in re Pyrotechnica.* I find another excel-  
 lent writer of *Pyrotechny* one Signior *Vannuccio Biringoccio*  
 a Nobleman of *Sienna* Printed at *Venice* the third time in  
 1559. to use other materials for his *Coal* then our *Virtuoso*

*de vulner: sclo-*  
*pet 911.*

Dr. Read also  
 reckons them  
 coals as made  
 indifferently of  
 willow, or stalks  
 of Hemp: of  
 wounds lit. 13.  
 Art. mag. or  
 till. p. 1. l. 2.  
 c. 13.

propounds. " To make the *Coal* some besides *Willowes* use  
 " the branches of vine : some make it of *Noctido* a *Nut tree*  
 " *Hazel*, *bay-tree*, of the bark of the fruit of the *pine*, and  
 " some of those twigs they make *Baskets* with, some of  
 " young *Elder*, and some of *Cane* or *Reed* : and in fine, those  
 " coales that are made of *gentle*, *pliable* and *flexile* wood  
 " with pith enough, and that be fine and young and with-  
 " out hard knots, are fit for this use, and it is made in divers  
 " manners in great quantities. It is made after the fashion of  
 " common coal. Those *Virtuosi* that have little to do, use to put  
 " twigs split into a large pot or other Vessel of Earth, Iron,  
 " or Brass, and cover or lute it well about that nothing may  
 " respire; and then make a fire upon it, continuing it so long  
 " that they beleive the twigs are sufficiently burnt without  
 " flame; and then they let them coole, and take the coal for  
 " their use. When I have had present need I have done it  
 " without all this adoe I have taken a quantity of clear  
 " dry twigs, and broke them to pieces and laid them on an  
 " heap close, and set them on fire, and let them burn well:  
 " then with a Scoop or a ladle I have sprinkled water on  
 " them, and then gently scatterd the fire and quenched  
 " them.

But whatever the common practice be, the addition of  
 coal is not so necessary, but some other things may be substi-  
 tuted instead of it, which practice is usual with those that  
 make *Gun-powder* of sundry other colours besides black.

*De pulvere pyrio variis coloribus colorato.*

*Pulveris communis pyrii nigredo ex carbonum atro colore re-*  
*sultat. Possibile tamen eundem alio quoq; colore tingere, si carbo-*  
*num loco vel lignum putridum, vel papyrus alba humefacta prius*  
*postea in furno calido siccata et in pulverem trita, vel aliud quid-*  
*piam simile, facile ignem arripiens et combustibile (ut in sequenti-*  
*bus patebit) sumatur, varij; colores addantur. Proponemus igitur*  
*hoc capite mixturas aliquot ex quibus ipsimet propriis manibus*  
*sapius variis coloribus coloratos confecimus pulveres.*

*Pulvis*

*Cos. Simiemo-*  
*nich, art. mag.*  
*art. p. 1. l. 2.*  
*c. 15.*



*Pulvis albus.*

1.

*Salisnitri lb. 6. Sulphuris lb. j. medulle sambuci exiccatae lb. j.*

2.

*Salisnitri lb. 10. Sulphuris lb. j. corticum vel partis lignosae Cannabi decussae lb. j.*

3.

*Salisnitri lb. 6. Sulphuris lb. j. Taratri ad albedinem calcinati, dein in aquâ communi in ollâ non vitreatâ ad evaporationem totius aquae cocti unc.*

*Pulvis rubicundus.*

1.

*Salisnitri lb. 6. Sulphuris lb. j. Ambra lb. sc. sandali rubri lb. j.*

2.

*Salisnitri lb. 8. Sulphuris lb. j. papyri exiccata et in pulverem trita, et in aquâ cinnamobaris aut ligni Brasiliiani cocta et iterum exiccata lb. j.*

*Pulvis luteus.*

*Salispetre lb. 8. Sulphuris lb. j. Croci sylvestris cum vino adusto prius cocti, dein optime exiccati et pulverisati lb. j.*

*Pulvis viridis.*

*Salisnitri lb. 10. Sulphuris lb. j. ligni putridi cum erugine aris et aquâ vite cocti, dein exiccati lb. 2.*

N 3

*Pulvis*

*Pulvis caruleus*

*Salisnitri lib. 8. Sulphuris lib. j. Scobis ex ligno tilie cum indigo et vino adusto coctæ, dein exiccata et pulveris atæ lb. j.*

It might have become our *Virtuoso* in an *History of Gunpowder* not only to have declined these *Errors and Mistakes*, but to have treated of these sundry sorts of powder, thus coloured: as also to have taken notice of the difference betwixt *Cannon-powder* and that which is used for *Musquets & Pistolls*, which distinction, as observable as it is to every ordinary person, is not taken notice of by our *Historian* further then that out of the same mass the great cornes serve for *Cannon powder*, the less for *musquet and pistoll*. whereas great *Artillery* requires other powder then the small; & the materials of *Gunpowder* are differently proportioned to make up the several powders as appears by the *pyrotechny* of *Vannuccio Biringoccio*.

To make common powder for great *Artillery*.

Take of Nitre refined three parts,  
of Sulphur 1 part.  
of Coal of Willow 2 parts.

To make that for the middle sort of *Artillery*.

Take Nitre refined 5 parts.  
Coal 1 part and an half.  
Sulphur one part,  
Let it be well incorporated, granulated and dried.

To make that for *Arquebusses and Pistolls*.

Take Nitre refined 10 parts.  
Coal of Hazell-twigs cleansed 1. part:  
Sulphur 1 part.

Some to make it better.

Take



Take Nitre, 13 parts and an half.

Coal two parts.

Sulphur one part and an half.

Let them be well beaten and incorporated &c.

I find also the accurate *Casimirus Semienowicz* to make a treble distinction of Powder which I shall set down, as being the best and most approved in the world. which when I have done we shall not much lament the concealment of that cheat or secret Mr. Henshaw could well learn, but with promise not to divulge it: it not being other then to subtract from the Petre, and make up the weight in coal whilest (by this improvement of Gun-powder by the *Virtuosi*) his Majesty payes as if there were the proportion of Salt-Petre,

*Mixtura ad triplicem pulverem conficiendum optima probatissimaq;.*

*Mixtura pulveris  
ad tormenta Majo-  
ra.*

*Mixtura pulveris  
ad Sclopeta majora  
vulgo musquetas.*

*Mixtura pulveris  
ad Sclopeta mino-  
ra, vulgo pistolos et  
alia.*

1

1

1

*Salisnitri lb. 100.  
Sulphuris lb. 25.  
Carbonum lb. 25.*

*Salisnitri lb. 100.  
Sulphuris lb. 18.  
Carbonum lb. 20.*

*Salisnitri lb. 100.  
Sulphuris lb. 12.  
Carbonum lb. 15.*

2

2

2

*Salisnitri lb. 100.  
Sulphuris lb. 20.  
Carbonum lb. 24.*

*Salisnitri lb. 100.  
Sulphuris lb. 15.  
Carbonum lb. 18.*

*Salisnitri lb. 100.  
Sulphuris lb. 10.  
Carbonum lb. 8.*

*Mixtura pulverum ad Tormenta & Majora Sclopeta, inter  
pinsendum vel Simplici aqua tantum, vel aceto, vel urina, vel  
vino adusto humectari et inspergi possunt. Sin autem ad Sclopeta*

N 4

minora.

minora fortiore[m] vegetiore[m]q[ue] exoptamus pulverem, superiores  
duæ mixtura sequenti liquore, vel aquâ ex corticibus, malorum  
Aurantiorum, et Citrinorum, et Limoniorum recentium Chymicis  
organis distillatâ inspergantur sæpius, p[er]senturq[ue] per Horas 24  
deinq[ue] in minutissima granulentur.

Liquor autem componitur ex vini adusti mensuris 20. Spiritus  
aceti ex vino albo distillati mensuris 12. Spiritus Nitri men-  
suris 4. Aqua simplicis ex Sale Armeniaco mensuris 2. Camphora  
ex vino adusto subacta, vel cum Sulphure trito pulveri sata, vel  
deniq[ue] cum oleo Amygdalarum dulcium in oleum redacta, men-  
surâ 1.

*Aqua ex Sale Ammoniaco.*

Rec. Salis Ammoniaci 3 drach. Salis Nitri unc. 1. redigantur in  
pulverem tenuissimum et probe misceantur: postea in Alembicum  
imponantur, et aceto fortissimo infuso, distillantur igne lento

I have oftentimes wondered with my self how it was  
possible for Mr. Henshaw to penne, and for the Royal Society  
to approve so pittyfull an History of Salt-Petre and Gun-  
Powder. They are certainly a lamentable sort of Scriblers,  
that write so ill, having so good Copies before them! That  
noble Siennois, whom I have already cited; Nicolo Tartaglia  
in his *Questi et inventioni diverse*: and Pietro Sardi in his  
book *L'Artiglieria* have written excellently well of this sub-  
ject: and in the year 1650 Casimirus Semienowicz a Lithuanian  
Knight and formerly Lieutenent of the Ordnance to the  
King of Poland, published a most Elaborate discourse about  
the use of the great Artillery; He was a man that made those  
studies his business & having signalized himself by his skill in  
the management of all manner of Artillery, he was employed  
& Honoured by Uladislaus the 4<sup>th</sup>. King of Poland & Sweden,  
by him encouraged to that work, & to accomplish it the bet-  
ter at his charge sent into Holland there to perfect his know-  
ledge. This Eminent personage in the second book of his first  
part hath handled all that appertaines to the making of Salt-  
Petre and Gun-powder, to the tryall, and to the keeping of  
it: And were not the discourse too long, I had inserted it  
here but because I have already made use of several passa-  
ges out of him, I shall here adde the discourses onely of  
Pietro Sardi and Nicolo Tartaglia; where they are defective or  
need



need amendment I shall supply all out of *Cas. Semienowicz*, whom *Kircher* calls *Semienovius*, in his *Mundus Subterraneus*, and out of him transcribes most that he hath about this subject there,

The Discourse of *Pietro Sardi* about Salt-petre, & Gun-powder, in his book *L. Artigleria lib. 3. Cap. 49, 50, 51, 52, 53, 54.* printed in *Venice*, in folio.

**S**al Nitri, being the Ground-work, strength and Spirit of the Powder which by the Quantity and Perfections of the Nitre, is said to be more or less fine and effectual, it seems good here to discourse somewhat concerning it, whence it is Generated, how made and Reduc'd to perfection; to the end the Gunner in every occasion, (wanting Powder, Powder-makers and Saltpetre-men,) may know how to make it, if not in that perfection which the Saltpetre-men do by their Art, yet at least such as may serve in time of Necessity.

*Sal Nitri* is Extracted from the Earth in great quantities, and from walls in small; to wit, from that Salt, which some walls of Cellars and vaults under Ground, exposed to Humidity do spue forth.

It is drawn from the Earth, but not in all places, but such as are Proper, as those are, that are obscure and Cavernous, whete the rain falls not, as in the stalls of Animals great and small, and Particularly Goats, Sheep and Hogs. In *Gascoigne* in umbrosis, & cavernosis, ad quæ tam radijs Solaribus, quam pluvix et omni dulci aque aditus præclusus est. Tum etiam in equilibus, & aliis claustris non Subdialibus, sed testis, ubi omnis generis pecora: ut sunt boves, capræ, sues, oves, et his similia alia locari et concludi: necnon ubi homines ipsi urinam reddere solent. Tum denique in illis locis in quibus post campe stria commissa prælia, plurima cæforum militum corpora in foveas coniecta, et super his immensæ terræ moles superstructæ sunt. Ex his post multa annorum intervalla, plurimum materiæ Salnitrosæ erui vidimus in *Valachia* et *Podolizæ* desertis inter *Bohem*, et *Boristhenem*. *Cas. Semienowicz* p. 1. l. 2. c. 2. yet in *England* I cannot hear that they digge for it in places dunged with Sheep although the Covert, and time may have seemed to have concurred apparently to generate it.

○

France,

These three  
ways are appro-  
ved by Cas. Se-  
mienowicz; but  
if he say that  
Salt-petre-earth  
bites a little  
to the tast. lin-  
guum mordacius  
corrodit, he doth  
not say it is bit-  
ter, as Mr.  
Hesshaw doth. p.  
266:

Si citrei et ad  
albedinem verg-  
entis aliquantu-  
lum coloris in  
ferro frigefacto  
signa inveneris  
de valor et bo-  
intatet erre non  
dubites. Cas.  
Semienowicz. p.  
1. l. 2. c. 2.

Si strepitum  
aliquem edere et  
lucidos in altum  
surgere favillos  
observaveris,  
multo sale ni-tri  
terram ejusmo-  
di abundare ju-  
dicabis, id. ib.  
Cineris usti ex  
robore, fraxino,  
ulmo, acere vel  
aliis fortibus et  
duris ligni s. ib.

\* Cerro.  
\* Sarmeni fig-  
nifies also flags,  
fegs, or Reed  
growing by the  
waterside,  
Hujus cineris  
fumanur  
parces due, et  
calcis viva tres  
ae una bene  
miceantur. id. ib.  
\* Tinaccio, a tun,  
Bagida.

France, I went in the company of the Commissary of the Ar-  
tigliery of the City of Burdeaux, through the Caverns  
of the little hills and Mountains, that are situated on the  
River Garonne, drawing and digging in many places, Great  
quantities of this Salt-petre-Earth; and in Brussels I have seen  
them draw Sal-Nitre from Rubbish and Dust of old walls.

And in France there is Commission given to the Principal of-  
ficers of the Artillery, dispersed through that vast Kingdome,  
to enter into all houses private and publique, to find out such  
Salt-Petre-Earth; and the private persons are forced to be  
patient because it is for the service of the King.

There are Three ways to know if the Earth be Pregnant of  
Salt-Petre. 1. with the Mouth, putting a little on the tongue,  
if there be sense of a biting tast. 2. with a Burning Iron, thrust  
into a hole made with a Sharpe wooden Stick, and suffering it  
to Coole there; and if upon drawing it out it appears of a  
yellow whitish Colour, it is a signe there is Nitre there,  
but if it remains of the natural colour, it is unprofitable.  
3. It is proved likewise, taking a handful and sprinkling it  
lightly on burning Coales, if there be perceived any crackling  
noise, and any sparkles issues forth speedily, it shall be a sign of  
Salt-petre-Earth, otherwise of none.

Having got great quantity of this pregnant Earth, you  
ought also to have Ready a good quantity of Ashes made of  
Oake, \* holme Oake, or \* Vine-branches or some other Strong  
wood, with a sufficient quantity of Quick-lime, which things  
being thus prepared, take two parts of the said Lime and three  
of Ashes and let them be well mingled together.

Let there be also prepared a Great \* vessel, placed on high,  
in such manner that under it may stand another vessel to Re-  
ceive the water, that shall be strained from that above.

In the upper Vessel shall be put broom or straw in the Bottom  
or plain, and over the hole where the water is to issue out,  
shall be placed a Piece of a Tile, or some such thing as the  
women do in their Bucks, and the Hole must be shut very  
well.

Afterward take the Sal-nitrous Earth moderately dried,  
and put it into the vessell a handfull thick, and upon that a  
ground



Ground (of two or three fingers high) of that *Ashes* and *Lime* mingled together, and then a ground of *Earth*, and againe of *Ashes* and *Lime*, continuing this Course untill the vessell be full within a handful and an half.

This being thus managed, let it be filled up with common water sweet and clear in which is not the least salt, and because the *Earth* will quickly suck up the water, let it be put in so by degrees till the *Earth* will admit no more, and the vessell be filled equal to the *Earth*, and not higher.

It being thus filled, let it stand twenty four hours, or more, after which time open the tap-hole, and let the water strain into the vessell underneath, which being all strain'd, let that water be emptied into another vessell or Tun and reserved, and then put in some fresh water into the *Earth*-vessel as before, letting it stand for the space of twelve hours, then opening the *tap-hole* again let it strain into the vessell, which done, put apart into another vessell this liquor, and not in the first: Do this a third time and empty it into a third Vessel.

This being done, make proof of these three waters by putting some few drops on your tongue, and tasting it you shall find the first *very biting*, the second lesse, and the third least of all, for the first draws more of the substance of the *Salt-peter*, then the second, and the second then the third.

But there may be the fourth operation, for sometimes the *Earth* doth retain so much *Nitrous* substance therein, that it may prove advantageous even to the fift and sixt time; and all the waters are to be reserved apart, with the distillations of the first, second, third &c. as many as there shall be.

By this operation of one vessell or tun, may be apprehended the manner of making an hundred or as many as you please, according to the Quantity of the Prepared *Earth*, observing always that the first waters strain'd be put in one vessell, or in what will contain them, and all the other waters (*Carelessly*) in one or more vessels that will hold them.

These last waters shall be taken and forced to pass over *New Earth*, operating as before, and so many times shall they

*gustasse acris, et gutta super aramento concrecant unde iterum expectandi crystalli. et sic per-*

Paululum exsic-  
cata. Cas. Semino-  
wicz ubi supra

Infundatur re-  
centis et dulcis  
aquâ tantum,  
quantum sat  
esse videbitur  
atque duos tres  
ve digitos, terzæ  
super extet. id.  
ib.

Antiquus pre-  
sents us with  
another way of  
making *Salt-*  
*Peter*, which  
because our  
Historians hath  
omitted, I shall  
set down: Ter-  
ra nitrosa aqua  
multa diluatur,  
deinde ad purum  
colatur. colatura  
si non satis di-  
ves halinitro est,  
denuo apponitur  
materiis et iterum  
cocta facto se-  
dimento per laci-  
nas transfertur  
in vas purum  
ibique coquitur,  
ad justam con-  
sistentiam Deco-  
ctum infunditur  
in Ollam, Diges-  
tum per dolia et  
alveolos, crystal-  
li congelati eximan-  
tur, residuus li-  
quor recoquitur  
ad medietatem vel  
tertiam donec.

crystalli. et sic per-

Pass over new earth untill you find the water sufficiently impregnated with *Nitre*, which you shall easily know by the tast; for the tongue will be hardly able to indure it for the great heat, and the waters will bear almost a new layd Egge without sinking to the bottom.

*igne lento prius, dein fortiori decoquatur ad consumptionem unius tertiae, id. ibid.*

Having Collected a sufficient quantity of this *Nitrous* water you must put it into one or more Great *Brazen* or *Copper* caldron (like those of the *dyers* accommodated to a fornace) which being filled of two thirds of such liquor (i. e.) in such manner that a third part of the caldron be yet empty, give fire to it at first gently, afterwards more strongly, by degrees, untill the boyling be well advanced, and so continue untill the caldron be but one third part full of liquor, or to say better untill but half of what was put in do Remain.

*Coque ad consumptionem medietatis, vel quousque spissior et densior evadat, id. ibid.*

The waters of one or more Caldrons being boyled and reduced to such a Quantity, let them be gently taken out, and put in a Capacious Tun, or Tuns, well hooped with hoopes of Iron, and let them be covered with hempen cloath and tables upon them very diligently, and so let them be left untill they coole, and that they be settled very well in such manner that all the Earthy substance and naughty *Salt*, be fallen to the bottom.

*Congeli.*

*Effundatur in ligneos canales, vel vasa alveata oblonga et lata magis quam profunda: nec tamen plus huius aquae sit in uno vase, quam ut spatium unius palmi in altitudine occupet, deinde vasa ligneis vel laneis pannis crassioribus contexta in frigido loco ponantur. id. ib.*

These waters being thus purified let them again be gently (that they be not troubled but the common Salt and earthiness left in the bottom) Returned in to the cleansed caldrons, and they being boyled as at first untill one half be consumed, or at least untill you know it be boyled and be coagulated, which will be known, when taking a little upon a stick and dropping it on a Polish'd marble or stone, if it remain congealed, or to say better thickned, it is a sign it is boyled, and therefore take it from the fire and suffer it to coole.

It being thus cooled & clarified, let there be ready some *Trays* made of Planks long & not too large nor too deep, but more large in the top then in the botome, let these be filled with the boyl'd and clarified waters a handfull high, putting into them some little sticks of wood without Barke, and cover the *trays*, and let them stand so two or three days, and at that time or longer, according to the season you shall find the *Sal-Nitri*, Congeal'd

Congea'd



Congea'd and cleaving to the sides of the *Trays*, and the sticks, (after the manner of clear Chrystall,) which take away carefully and the water that Remains, let it be put to boyling anew as at first, leaving the salt and the dregs in the bottome of the *Trays*.

And because the waters in the boyling swell, and make a scum it will be necessary to take away that scum carefully, (as they do from the flesh-pots) and to reserve that scum to throw it upon the Earth taken from the Tuns to reimpregnate it with *Salt-petre*.

Moreover because the water in boyling will spatter out of the caldron, to remedy this let there be ready a strong lie, made 3 fourths of ferne Ashes, or the ashes of *Oak holme*, or *Oak* or with *Ash*, or *Maple* (such as was used at the first elixiviation,) and of one fourth of quick-lime, and in the said strong lie, for every hundred pints let there be dissolved four pounds for *Roach-allum*.

And of this lie so prepared, take one or two potsfuls, and throw it in by little and little when the Caldron swells, and it will presently be quiet, and descend, and become of a clear *Azure colour*, and the dreggs of the common salt will fall to the Bottome.

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Of

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## Of the manner to refine *Sal-petræ* to make *gun-powder*, cap, 50.

**A**LL the vigour of *Gun-powder*, consisting in *Sal-petræ*, its quantity, and its perfection, if the *Sal-petre* should be put in use of the first boyling, the *Powder* would not be so perfect and so strong, as need would require; for the quantity of Terrestrial matter, Common-salt and *unctuosity*, which also reside with the *Petre*, do hinder its vertue and strength, and therefore the *Artists* do always anew Refine the said *Salt-petre*, and purge it from every extraneous matter, as much as is possible, that they may obtaine the most strenuous effects of *Powder*, that can be desired.

Necessarium bis  
aut ter (immo  
pluries adhuc si  
tanto maiorem  
pulveris effectum  
habere volumus)  
purgasse et clarificasse  
id. ibid. c. 3.

This Refining is made in two manners, either with water commonly called the *wett*; or with *Fire*, commonly called the *Dry*, or the *Burnt*.

A Guazzo.

The *wett*, or with water, is made thus; They take as much *sal-nitre* as they please to Refine, and put it in a Caldron over a fornace, and upon that *Sal-nitre* they put such a quantity of fresh and clear water, as may be sufficient to dissolve it; they take notice of the quantity of the water, and for every barrel of water which they put into the Caldron, they put five or six Pot-fulls of that strong lie, made of *Ferne-Ashes*, *Oake*, and *Quick-lime*, and *Allum*, and giving fire to the Caldron at first softly, and afterward increasing it, untill the melted

Aliquot cyathi;  
Cas. Semienowicz. ib. c. 3.

Sabbione, sand  
or gravel. Imponatur Sabulonis loci et bene purgati tantum, ut ad altitudinem unius palmi super fundum vasis emineat. Cas. Semienowicz. ibid. c. 3.

*Nitre* boyle and rayse a scum. Let there be ready, a great Tun or vessel placed so high that another vessel may stand under it to receive the *Sal-nitrous* water, which by little shall strain from above, and in the said great Tun let there be put a hands-breadth of cleane and wash'd *Sand*, and upon that a great linnen cloth doubled, (as the laundresses do) and on that poure the water from the Caldron, (which contains the melted *Nitre*) as soon as it boyles and the scum is taken from it, and let it strain by little and



and little by the tap into the vessel below, as they do in making their *Bucks*.

Which water being all strained, let it be put into a cleare Caldron and boyl it till by the proof of a Congealed drop, it may be known to be well boyled, (not forgetting to give it some of the strong *lie*, of *Allum*, *Asbes* and *lime*, when the Caldron swells and would spatter out the water, and having made proof it is boyled enough, let it be taken out and put into the long *Trays*, to coole as before, and preservethe congealed *Salt-petre*, and returne the water to boyle again that remains, and againe to congeale, and do so untill the water Give no more *Salt-petre*.

Now this *Salt-petre* so Refined, is called *Salt-petre Refin'd* of the second boyling, as the *Refiners*, of *sugar*, call their *Sugar Refined*, of the Second, Third or fourth, boyling, and to make *Saltpetre* of such perfection, you may (as some do) *Re-fine* it, that is Reboyl it, in such manner the third time, proceeding always as before.

Because that there is such difficulty in the depurating of *Salt-petre* from the fixed common *Salt*, *Allum* & *Vitriol* which adhere to it, & that, without this be done, no man can judge whether the *salt* it leaves upon calcination be from the *Nitre*, or some other body, which by the usual process even of Mr. Boyle, by filtration and coagulation can never be perfectly separated, nor the *Petre* reduced to crystals of the right Signature. *Quocunque enim studio et labore vulgari Sal-petra ex stabulis bestiarum erutus per solutionem et coagulationem purgetur, impossibile tamen est, ut munditiem suam debitam et Signaturam veram consequatur.* so *Glauber. de signat. Sal. pag. 27.* And because the crystals of *Nitre* appear best in their own shape, after such an exact depuration, it may not be omitted to tell you what Mr. *Henshaw* might have done, for it is evident he had read *Glauber*, viz. that the sole way of making pure *Nitre*, is to take the course Mr. Boyle found out, to burne part to an *Alkali*, and to powr upon a filtrated solution of that the Spirit of *Nitre*, and evaporating it to a cuticle, to crystallize it in a cold place; But there is another way that may not be useless in *Casimirus Sennenoniez p. 1. l. 2. c. 8.* Sume 2 lb. calcis vive. 2. lb. salis communis. unam lb. viridis. aris. 1 lb. vitrioli Romani. 1 lb. salis Ammoniack, omnia simul mixta pulveri sentur: postea ponatur omnis materia in vase aliquo ligneo, & aceti, vel vini, aut in defectu horum aqua dulcis limpida superinfundatur, bona quantitas, et fiat lixivium; Quod per tridui spatium sibi relictum c larescat. Pone deinceps salem-nitri in caldario, et superinfunde ran-

*antibus lixivij ac salis-nitri cooperiat, presq; lento igne ad consumptionem mediae partis totius liquoris: residuum effunde in aliud vas, faeces autem omnes immundas, quas fundum caldarij petisse videbis foras ejice. frigescat postea aqua salnitrosa et ulterius elaboretur, more consueto, that is in such manner, as is prescribed by Sordi and him, in the first boyl'ing of Salt-petre.*

The Refining *Salt-petre* by fire, to wit the dry, is made in this manner, they have a great and capacious and thick vessel of *Brass*, *Copper*, or *Iron*, placed on a *Fornace*, and in that they put, what quantity of *Nitre* they please, and making a gentle fire at first, and increasing it by degrees untill the *Nitre* be perfectly melted and running, and begins to boyle, and having ready fine powdered *Brimstone*, they throw some of it in the top of the melted *Nitre*, and if the *Brimstone* fire of it selfe, it is well, if not with a coale, or having a stick they fire it, and this *Brimstone* so fired, they let alone untill it have consumed all the grease which swims upon the said *Salt-petre*.

The which being all consumed, the *Salt-petre* is emptied into what vessels a man will, that the Loaves or Pieces of *Salt-petre*, may become large, of which he may prepare what quantity shall seem sufficient, and in the bottom of the *Cal-dron* will remain the Dreggs and common salt, the *Salt-petre* being cooled, becomming like a piece of fine white *Marble*, & in this manner you may refine it as often as you will, and it shal always prove more perfect, and worke greater effects.

## Of the Manner how to Re-impreg-nate the Earth, taken out of the Vessells with new *Salt-petre*.

**H**AVING taken out the Earth from the Vessells, after that the water hath extracted al the *Nitrous* substance therefrom, let it be spread on the face of the Earth, but not exceeding a foot thick, and in some covered place, that it be subject to neither Rain nor the sight of the Sun.

Which Earth being so ordered and spread, get a great quantity of Dung, as well of great Cartel as small, and spread



spread it on the Earth, as thick as you can, one or two foot thick, or more if you have dung enough.

Upon this dung cast all the scum; and the waters which were taken from the *Salt-petre*, leaving the Earthy dreggs, and the common *salt*.

And afterwards gathering in all publique places, in vessels prepared to that purpose, as much Human urine as is possible, and every Day cast it on the *Dung*, and doing so at two years end, that Earth will be impregnated, with as much *Nitre* as ever, and it may be with greater advantage.

## How to prove *Salt-petre*, to know its finess. *Cap. 52.*

**T**AKE a Pound of *Salt-petre*, and put it on a smooth white Table, and with burning coales fire it, in the doing whereof note these effects.

If it make a noyse as *Salt* does, when it is cast on burning coales, it shall be a sign that it retains in it much common-*salt*.

If it make a fat *scumme*, it is a sign it hath too much *fatt*.

If after it is all burnt, it leave in the bottom filth, it is a sign it yet retains some of the Earthy substance, and the greater these signs are, so much the more extraneous matter doth the *Salt-petre* contain, and it is so much the less purified fine, and of less Vigour.

But if the flame it cast be \* cleare, windy, long, divided into many parts, after the manner of Brandishing Rays, or beams of light, that the Table remain clean, if it is burn'd as pure coale that makes no *scumme* or noyse, then the *Salt-petre* may be said to be well purified and perfect.

\* Si fecerit  
flammas cla-  
ram, longam, &  
in plurimos  
radios disper-  
sitam, fundum  
vero tabulae  
remanferit

mundum: arseritque puri carbonis modo, sine omni spuma & crepitu horrido, minusque con-  
venienti, purgatum bene & perfectum esse salem nitri conjecturam capere licebit. *Cas. Semien-wicz.*  
*ibid. cap. 7. & Kircher. Mund. Subterr. lib. 6. Sect. 2. cap. 3.* Quidam injectum candenti prunæ spe-  
ctant, argumento bonitatis & puritatis, si diffuset & deflagret sine reliquiis salis communis, aut fœ-  
cum terrestrium, & saltu crepitante. *Libazarius, Apocalyps. Hermes. p. 6. 1. cap. 17.*

## How to know the goodness of Powder. *Cap. 53.*

**T**he goodness of *Powder* is known by the *Eye*, the *Touch*, and by the *Fire*: by the *Eye*, if it be very *Black*, or that it is *Moist*, and put upon white paper and tinging it with black, it is a sign that it hath too much *Coal*, but if it be of dark *Ash-colour* and tinge not, it is a sign that it hath its proportion of *Coal*, and it is dry.

*Berettino, Grey or Ash-colour.*

*Nimia in pulvere nigredo,*

*signum est humiditatis: hæc si super papyro munda ponatur, & eandem nigro tingat colore, signum erit cum plurimum in se continere carbonum: cinericius autem sub-obscurus pulveris color, & aliquantulum ad rubedinem vergens, bonitatis vestigium est. Caf. Semienowicz, ibid. c. 17.*

With the *Touch* it is known, when rubbing it with the fingers, it appears soft and easily broken, it is a sign of too much *Coal*: and when rubbing it and powdering it with the fingers, you feel some little knobs that prick the fingers, it is a sign the *Sulphur* is not well powd'ed and incorporated, and that the *Powder* is not elaborated enough.

With the *Fire* likewise is known the goodness of *Powder*, taking a pound of it, and putting it on a Table smooth and white, and near unto it another, a third, fourth and fifth pound, so that they do not touch: and then giving fire unto a little heap, if at one and the same time all the heaps are fired, if the flame be raised clear and quick, cracking in the raising, it is a sign it is fine and well labour'd, but if the flame be slow in raising and with much smoke and without noyse, it is a sign of the little strength of it, of the great quantity of *Coal* and *Sulphur* more than it ought.

*Denique ignis beneficio in notitiam bonitatis pulveris facile devenimus: si nimiorum pusillas aliquid congeries pulveris super tabula lignea munda & polita, latitudine dimidii palmi a se invicem distantes posuerimus, & unicam tantum ex omnibus incenderimus. Hæc si subito flammam conceperit, & sola tantum, aliis non accensis, conflagraverit, idque cum fragore & sonitu quodam: feceritque fumum album, clarum, & in ascendendo velocem: in aere vero circulus quasi quidam, seu corolla fumosa appareat, perfectissime pulveris nota erit.*

If after it is burnt the Table remain black, it is a sign of too much *Coal*; if *unctuous*, it is a sign of the grease of the *Salt-Petre*.



*Petre* and *Sulphur* that were not well refined : and if with earthiness, and little gránulets of matter, it is a sign the *Salt-Petre* was not well purged of common Salt, and earthy matter, and that the *Sulphur* was not well powder'd and incorporated ; and if after the powder is burnt, the Table remain whitened, it is a sign the *Salt-Petre* hath much of common Salt, and that it was not well cleansed from that.

## Of Powder spoiled, and the ways to Recover it.

**B**Y *Powder* spoiled is meant that which wants much of the vigour and vertue which it had in the beginning : now this want proceeds from no other thing, than that the vertue of the *Salt-Petre* which gives it that vigour is weakned and vanish'd.

Now the Vertue of *Salt-petre* reduced into *Gun-powder*, is lost either by *Age* or *Moisture* ; by old *Age*, because being conjoy'nd with *Coal* and *Sulphur*, it doth participate of that corruption which will happen to them in time : by *Moisture*, because the *Salt-petre*, (composed of *Salnitrous Waters*, as all other *Salts* of their *Salt waters*) does no sooner as it were see the moisture, but by that, by little and little it is converted into moisture, and the vertue and vigour thereof is exhald by that humidity.

Thus a great part of the *Salt-petre* being separated by this Humidity from the rest of the Composition of the *Powder*; and the *Salt-petre* being more ponderous than the other two materials, which are not exhaled, as is the *Petre*; it follows, that of that quantity of *Powder* which in the perfection of it was inclosed in the Barrel : For example, one hundred pound, after the *Salt-petre* is wasted in this manner either by old *Age* or *Moisture*, there will not remain the same quantity, but much less.

Now to recover this *Powder* thus wasted, it is to be done two ways, viz. to adjoyn the quantity of *Salt-petre* is wanting to make it vigorous and perfect ; or to take away that

Carbones ramē & sulphur  
minime hic suo  
quem antea habuere,  
privantur pondere,  
cum nullo dissolvuntur humore : imo  
carbones studiose cum attrahunt, fiuntque ponderosiores.  
Id. ibid. c. 18.

Powder of Gunpowder

*Salt-petre* which remaining in the wasted *Powder*, to refine the *Salt-petre*, and to make other *Powder* anew with it.

There is another way of recovering decayed *Powder*, by fortifying it with a certain *Lixivium* proposed by *Cas. Semionowicz*, p. 1. l. 2. c. 18. which you may see in him.

To recover that same weakned *Powder*, by the vanishing of the *Nitre*, proceed in this manner : Take all that quantity of wasted *Powder*, and put it on a cloath, and lay it in the Sun to dry, which being perfectly dried, fill a Barrel with it : for example, let there be one hundred pound :

Then let it be emptied aside, and let the Barrel be filled with perfect *Powder*, such as was the spoil'd in the perfect vigour of it, let it be weighed and noted how many pound it weigheth : for example, suppose one hundred and twenty.

Here we say that those twenty pound more which the Barrel of perfect *Powder* weighed, shall be twenty pound of *Salt-petre* which the other wanted.

Now let us see how much wasted *Powder* there is in all, and if there be for example 10000 pound ; for to know then in this great quantity of naughty powder how many pounds of *Salt-petre* there are wanting to reduce it to perfection and vigour.

Work with the Golden Rule of the 4 Proportionals, saying, If one hundred pound of wasted *Powder*, there want 20 pound of *Salt-petre*, how much *Petre* will there be wanting in ten thousand ?

Let the second number be multiplied by the third, viz. 20 by 10000, and the product shall be divided by the first, viz. by 100, and you shall have 2000 in the Quotient, and these shall be the pounds of *Salt-petre* which are wanting in the wasted powder to reduce it to perfection.

Let these 2000 l. of *Salt-petre* be powder'd, & likewise the 10000 of bad powder, as the manner is, and taking a proportion, let it be incorporated with the 2000 of *Salt-petre*, beating them together according to Art ; and in such manner working them, there will be made good *Powder*.

If we will take away all the *Salt-petre* out of wasted powder, we must proceed in this manner : Let there be prepared one or more capacious Tubbs, and on them let there be laid three or four linnen Cloathes (like the skins of a Drum) well tied, but not so strait. Then



Then let there be another Vessel or more of Copper or Wood, and put therein the quantity of spoiled Powder, that shall seem fit, and pour upon it as much fresh clear Water as shall dissolve it, stirring it with a cudgel or a Schoope.

This being liquified, with a Ladle or Bucket, throw it upon the cloath over the Table, that the clear water may strain into the Tubb, and upon the cloath may remain the Coal and the Sulphur: and when it is all strain'd, throw softly a Bucket or two of water to draw away the substance of Salt-petre that shall remain with the Coal and Sulphur.

And in this manner shall be done until all the Salt-petre of the naughty powder be strain'd, drawing away the strain'd water in the Table when it is full, and if these waters are not clear, let them be put on again on the washed and cleansed cloath, and let them be strain'd again, until they are clear.

Then take all these clear waters and boyl them in the Caldrons as before, and then put them in the Trays to congeal and make Salt-petre, and taken and refined, and new Powder made of it as the manner is; and the Coal and Sulphur may be dried perfectly, and proof made if it will serve, but if not, you must take new Sulphur and Coal.

But here I do advertise that all that is here said, is written only that the Gunner in time of Necessity may supply himself and do the best that he can, for such Salt-petre and Powder is not made with that diligence and Art that the Powder-Masters and Salt-Petremen do, but yet it will not fail to serve in time of Necessity.

*Dal. Pietro Sardi: in Venet. 1629.*

*The*

*The Third Book of the various Questions and Inventions  
of Nicolas Tartaglia.*

**Of Sal Nitre, and the various compositions of the Gun-Powder : of the Propriety or the particular office which each of the Materials hath in that Composition, and other Particulars.**

*The first enquiry made by Seignior Gabriel Tadino Prior  
of Barletta.*

*Prior.*

**I** S it not to be wondred at, that the Antients had no knowledge of *Sal-Nitre* which to us Moderns is become so familiar?

*Nicol.*

Nitre is mentioned Jeremiah 2. 22. & Prov. 25. 20. although in the Septuagint that last verse is varied, yet Symmachus reads it  
ἡ νίτρος  
ἐν νίτρον  
and St. Hierome follows it, and so does the English translation.

Yea, Rather the knowledge of that Simple is most Antient; for most of the Antient Naturalists make mention of it; true it is that some of them, and especially Avicenna have called it Baurach, because it is so called in the Arabic Tongue; some Aphronitum, because it is so nam'd in the Greek; and others as Serapion, Dioscorides and Pliny have call'd it Nitrum, or Spuma Nitri, for the Latins so call it; and in the Pandects it is affirmed there are two sorts of Nitrum, or Sal Nitri, viz. Mineral, and Artificial, of the Mineral they say there are four, the Armenian, African, Roman, and Egyptian. Serapion says, that the Minerals of Sal Nitre are as the Minerals of Salt, for there are found of it, that are running waters, which become congealed and condensed like a stone, and this is affirmed also by Pliny, that it is found also in the Mine as a stone, and called Sal Petrolum; yea, he says that this Sal Nitre is found White and Red, and of many Colours, inso-much that he affirms that there are many kinds of it, not only for the diver-



diversity of the colour, but because there is found one that is Spongy, viz. full of holes, another very fragile, and laminæ or plates; and of many other qualities, which would be too long to talk of one by one, of which one is more biting and powerful than the other: of the Artificial it is not worth time to speak, it being in these days better known than Betony.

Truly, I thought the knowledg thereof had been *Modern.* *Prior.*

But tell me, I pray, If the *Antients* had knowledge both of the *Natural* and *Artificial Nitre*, (as you have proved by the Authority of the *Antient Naturalists*) did they also know that it burns so vigorously as it does? *The 3 Quest- on.*

Truly the *Antient Naturalists* make no mention of it, save only of those proprieties that are found in it necessary to Medicine; but many other *Antient Authors* do acquaint us that they knew it burn'd; for they serv'd themselves of it in Compositions of fire for to burn the *Testudo*, or *Ram*, and the *Ellepoli*, and other portable *Towers*, which they used in those days in taking of *Cities*, and also to burn the *Naval powers*: it is true that in such Compositions, some call it by the name of the *Burning Salt*, and others the *Stone Salt*, and *Salt of Skill*, and others by the proper name of *Sal Nitri*. *Nicol. C. sinus Sc. micuovicz.* thinks that the *Antients* did seldom or never use *Salt-petre* in their *Fire-works*; and that where-soever it is found mentioned as an in-

gredient in the *Ignis Græcus*, &c. and that passage is spurious: at least if it were used, it was kept as a secret: for amongst the most renowned Writers of the *Roman Wars* and *Militia*, *ne jotta quidem unum* in *illorum Commentariis de Sale Nitri, Nitro, aut Sale petre, quod Romanorum ignibus artificialibus inservierint, reperiet quispiam.* *Atmag. p. 1. l. 2. c. 1.*

Concerning this I have another doubt, If the *Antients* knew that *Nitre* burnt with so much force, how comes it to pass that they knew not how to make the *Powder* for *Artigliary*, of so great importance in *Art Military*, as well as we *Moderns*? *Prior. The 3 Quest.*

The Consequence is not good to say, that if the *Antients* knew that *Sal Nitre* burned, that of necessity they knew how to compound the *Powder*; for that is not made of *Sal Nitre* alone: yea, it is compounded of three *Materials*, of *Nitre*, *Sulphur*, and *Coal*; and therefore it is possible they might have the knowledge of *Nitre*, and the Nature of it, and yet be ignorant of the Composition of *Powder*. *Nicol.*

You

*Prior.*  
The 4 Quest.

You have reason ; But for what cause is the Powder compounded of those three materials ? and what particular office hath every one of them ? And what effect shall Two have without the Third ?

Nicol.

The Powder is composed of these three Materials, because each one doth mediate & supply the defects of the two other; for the Sulphur is most apt to kindle the Fire with the flame of either of the other two, which fire with flame is very apt to introduce into fire the Sal Nitre more than any other, because the said Nitre burning resolves it self into a windy Exhalation, the which is so potent, that it presently quenches the flame introduced into the Sulphur, and consequently that introduced (by that of the Sulphur) into it self. For the Nature of Sulphur, and likewise of the Nitre is such, that the

So saith Semienowicz, also. Si componeretur corpus quoddam ex Sulphure & sale Nitri, optime rufis, & simul mixtis, admoto igne, subito quidem arriperet flammam, nihilominus tamen subito extingueretur, id est, ignis ille non continuaretur, perduraretque ad consumptionem & combustionem materiarum totius, sed paucillum tantum ex illa consumeret, residuo intacto. Art. mag. p. 11. 2. c. 29.

flame being dead, there remains not the least sign of fire, and therefore compounding together only Nitre and Sulphur well beaten, and putting fire to it, immediately it is inflamed and destroyed, for the Reasons abovesaid, to wit, that such fire will not continue until all the matter be consumed and burned, but only a little of it, and the rest will remain not offended by the said fire: therefore to cure this defect, there is mingled with both Coals well powdered,

because Coal is of that Nature, that touched by the flame of fire, it is presently kindled and converts it self into fire without flame, the which fire without flame the more it is vexed by any wind, so much the more it is enkindled and continued, until that all the substance of it be converted into Ashes: and therefore touching that Composition with the fire, immediately the Sulphur is taken with flame (as is said) which flame not only introduces presently fire and flame into the Nitre, but also in the same instant introduces fire without flame into the Coal, which fire is not extinguished, but rather augmented by the wind, and because that wind caused by the Nitre is not apt to extinguish that fire without flame which is in the Coal, yea, rather, as I have said, it augments it, and forasmuch as the Sulphur is contiguous with the fire with flame or without flame, and cannot be without flame, the which flame (as is said)

in-



inflames the Nitre, and therefore these three Materials powdered and mingled well together, and fire being put to this mixture, it becomes altogether inextinguishable, until all the substance be consumed: (except there be some accidental defect in some of the materials, either of Humidity, or that there were taken of them much different from the convenient proportion) and therefore it is concluded that the office of the sulphur is to take hold of the fire with flame, and to introduce it into the other Materials: and that of the Coal is only to maintain the said fire without flame, already introduced by the sulphur, and chiefly against that great wind which the Sal Nitre causes; but then the office of the Nitre is only to cause that great exhalation of wind, for in that wind consists all the virtue and propriety of the Powder, for that is it which drives out the Bullet with so incredible a force, and therefore it is concluded that only on the Nitre doth depend all the virtue and puissance of the Powder, and the other two Materials are put therein only to resolve into fire and wind the said Nitre, and for no other end: for be that should compound powder only of sulphur and Coal, and charge a Gun with a considerable quantity of it, I say, giving fire to it should not be able to drive forth a stick or a straw. And this proceeds because all the expulsive virtue depends solely on the pure Nitre, and not of any other thing, and therefore it may be rather concluded possible to make Powder without Coal and sulphur, than without nitre: for it is more probable to find other Materials to do the office of sulphur in taking fire with flame, and likewise of the Coal in maintaining the fire without flame, than to find another which shall be fit to cause so great and impetuous a wind, as the nitre does.

You have well assigned the cause why the powder is composed of those three Materials, and the office every one of them hath in the Composition, now I demand who was the Inventor thereof, and with what reason the proportion of each of the materials was determined by him.

Prior:

who was the Inventor of powder and Guns, it is spread amongst the Vulgar by the Authority of Cornazanus, who says it was found by chance by a Dutch Alchymist: but I am of opinion, that Archimedes the Syracusan, that famous Philosopher and Mathematician,

Nicol. The 5 Quest.

Q

was

was the Inventor of the Composition, and of the same mind is the Commentator of Vitruvius upon the first Book ; for of him it is written in many places ( as Valturius says in his tenth Book *Dere Militari* ) how he found out a certain Machine of Iron, with which he threw towards a Land Army stones of prodigious weight and greatness, and with an incredible sound ; which gives us to understand that it was a Machine like a great Gun, with which he threw great Balls of stone ( as it is not long ago, since the Moderns did, ) and chiefly for their great sound, which in discharging them happens, and in any other kind of Machine it does not appear to me it could be done except in one like it. True it is, that at that time it is probable they were more deformed and unhandsome than those used at this present time ; for the first Inventions are always something homely, but mend with time, it being an easie matter to add to things already found out ; and the same thing I say of powder which in the beginning was found out ( either by Archimedes, or by whom you will ) but was not compounded in such order and proportion as at present is used. Yea, I rather judge that from that time until this, the Composition hath been varied many ways, and that this is true I have found in some Book not very Antient certain ways and Orders of composing it much differing from the present, the variety whereof I shall here distinctly set down :

1 Gun-powder of the most antient way.

Sal Nitre

Sulphur

Coal.

} Each equal parts.

2 Powder not so antient.

Sal Nitre

Sulphur

Coal

} 3 parts  
} 2 parts  
} 2 parts

3 Powder not so antient.

Sal Nitre

Sulphur

Coal

} 10 parts  
} 3 parts  
} 3 parts

Powder



## Powder not so antient

Sal Nitre } 12 parts  
Sulphur } 3 parts  
Coal } 2 parts

## 5 Powder not yet so antient.

Nitre } 9  
Sulphur } 2 parts  
Coal } 3

## 6 Powder of the Moderns.

Nitre } 4  
Sulphur } 1 parts  
Coal } 1

## 7 Powder more Modern.

Nitre } 20  
Sulphur } 3 parts  
Coal } 10

## 8 Powder more Modern.

Nitre } 100  
Sulphur } 10 parts  
Coal } 36

## 9 Powder Great after the Moderns.

Nitre } 100  
Sulphur } 20 parts  
Coal } 37

## 10 Fine powder not very antient.

Nitre } 9  
Sulphur } 3 parts  
Coal of \* Mirochea } 6

## 11 Great Powder more modern.

Nitre } 2  
Sulphur } 1 parts  
Coal of Willow } 1

## 12 Powder of Harquebuses more Modern.

Nitre } 3  
Sulphur } 1 parts  
Coals of branches of } 1  
young willows. }

## 13 Fine powder more modern.

Nitre refined many } 5  
times }  
Sulphur } 1 par.  
Coal of the twigs of } 1  
young Hazel \* Avolane

## 14 Great powder more modern.

Nitre refined } 3  
Sulphur } 1 p.  
Coal of Willow } 2

## 15 Middle powder more modern.

Nitre refined } 10  
Sulphur } 2 p.  
Coal of Willow } 3

## 16 Powder of Harquebuses modern.

Nitre refined many } 10  
times }  
Sulphur } 1 p.  
Coal of \* the tender } 1  
branches of the }  
Filberd or Hazel }  
cleansed, Q 2

\* The Author  
confesses he  
knows not what  
Mirochea is.  
\* Verzelle.  
Nizola is a fil-  
berd or a hazel  
Probably, Ver-  
zelle may be  
the shell of the  
Nut, but I can  
not find it.

## 17 Gun-Powder more modern.

Nitre refined } 27  
 Sulphur } 3p.  
 Coal of the tender } 4  
 branches of the }  
 filberd or Hazel }  
 cleansed. }

## 18 Gun-powder more strong and modern.

Nitre refined } 7  
 Sulphur } 1  
 Coal as last before } 1

\* Nizolaro.

## 19 Pistol powder more fine and strong.

Nitre many times }  
 refined } 6  
 Sulphur } 1 parts.  
 Coal as before of } 1  
 Hazels, or Fil- }  
 berds }

## 20 Great powder modern.

Nitre } 4  
 Sulphur } 1 p.  
 Coal of Willow } 1

## 21 Great powder modern.

Nitre } 20  
 Sulphur } 4 p.  
 Coal of Willow } 5

## 22 Pistol Powder modern.

Nitre refined the }  
 dry way } 48  
 Yellow Sulphur } 7 parts.  
 \* Coals of filberd } 8  
 or Hazel, or }  
 Hempe- stalkes }  
 dried. }

## 23 Pistol powder modern.

Nitre refined } 18  
 Sulphur } 2 p.  
 Coal of Filberd wood } 3

Now to make any of the aforesaid Powders, it is necessary to take notice that the nitre be pure and potent; the which is known by the practices by burning a little; likewise that the sulphur be clear from the earth and other filth, and that the Coal be not moist by standing in a moist place, and that it be not mixt with Dust or Earth; Lastly, that it be well beaten, and the materials be well incorporated together: and making such powder it will not want effects answerable to the kinds of it, not forgetting that it be well dried, and kept in a dry place.

Prior.

Certainly there is reason to wonder at the various change of the proportions, and I cannot wonder, what should lead them so to determine them.

Nicol.

The first Invention (some believe it was by chance) I am well satisfied.



satisfied was found by reason speculatively; to wit, that these three Materials well beaten and mingled together should be apt to make a fire so strong and unquenchable, until each matter should be consumed, for there are clear reasons that it ought to be so, but to give the proportions of the said Materials, I believe they were advised by Experience; for the first Order was founded upon Equality, for they took alike of each, but although it might have a good effect, nevertheless perceiving that effect proceeded from the nitre, they took a greater quantity than of each of the other, and they found that Powder more potent than the first, and so with rational advice some have varied the order unto this day: True it is, there are some orders of the afore-noted that have been ordained with little Reason, and less judgment; yea, I believe some of them, (because they would not do what was done before) to shew their wit without any other reason have made new Inventions, viz. increasing the Coal and diminishing the sulphur, & vice versa, others varying all three in such strange proportions that it might appear found out with greater prudence and subtilty.

There are indeed a certain sort of Inventors who knowing not how to speak or do, but what hath been seen or done already by others, and are ashamed that it should appear that they have lern'd or taken any thing from those went before them, do force themselves to vary something from the former manner, or the speech, though it be to make it worse than it was before.

Prior.  
And Tartaglia was very sensible that some of his Inventions would be invented over again.

*It is a sad truth indeed.*

Nicol.

You have shewed me how the Order and Proportion of the three materials, have been varied from time to time, now I desire to know which of the afore-mentioned Orders you esteem to be the best, that is, the most perfect and potent Powder?

Prior.  
The 1 Quest.

Doubt.

Nicol.

Doubtless that which contains the greater quantity of nitre, I say that the greater in respect of the whole, therefore that of the 16<sup>th</sup>. Order shall be more potent than any of the rest, viz. that thus composed,

Thus in the Original.

Sal nitrio raffinato piu volte	}	10 parts.
Solfere		1 part.
Carbon de Verzelle de nizola giorene e monde		1 part.

Nitre refined many times	}	10
Sulphur		1 parts.
Cole of the tender branches of the Hazle or filberd young & clear.		1

and this shall be the most powerful for two Reasons: the first is, because it doth contain five sixths of Nitre, the which five sixths is greater than that in any other part occurring in any of the above specified Orders. The second is, because the Nitre is refined many times, which makes it more perfect: and there is in it also more perfect Coal; for if the Coal be made of a light and soft matter, it is more apt to receive, and more easily to maintain the fire, and so shall be more fit and disposed to do the office with celerity.

Prior.  
The 7 Quest.

You have concluded the 16<sup>th</sup>. Order to be the best powder, but I demand, if yet it shall not be more potent that shall receive a greater part, than five sixths of Nitre, and a lesser by one sixth between the sulphur and the Coal?

Nicol.

Without doubt it shall, provided that, that little part of the sulphur and Coal be but sufficient to do its office, which is discovered by taking fire with speed, and also by introducing and maintaining it in the Nitre until it be wholly resolved into fire, for if there be so little quantity of the sulphur and Coal as not to do its duty, that composition shall be but unuseful and of no value: and therefore it will behoove one to take good heed, for if it were possible to make good powder of pure Nitre, it would be the best and most powerful of all, but because it is not apt alone to take fire with that celerity with quick flame as does the sulphur, nor to conserve it till it is all consumed, as does the Coal, therefore it is necessary to give it the company of



the other two, and in such a quantity as may be apt and sufficient to do as it ought, which may be discovered, as I told you before.

I understand you well, but is this rule general for all kind of Artillery? for it is well known, that Pistols require finer powder than Arquebuses, Arquebuses finer than Musquets and Falconets; and Falconets better than other sorts of great Artillery: and therefore I demand whether it be not necessary to limit this composition, and finess according to the sorts of the Pieces?

Prior.  
The 8 Question.

It doth appear to me so, although it be the custome, yea I have an opinion it is an error as that about your Cannon in the xi Quest. of the first Book, about the length of Guns, quantity of Powder and weight of Bullets, &c. but I will consider better of it and make you sensible of the error in that thing.

Nicol.

Of the same opinion with Tartaglia in this last point doth Vannuccio Biringoccio seem to be, in that he thus expresseth himself. The great Artillery does require other Powder than the small, as the Gunners are pleased to say. But the common Experience, as well as the authority of Casimirus Simienowicz, doth shew that the large grained powder, called Cannon-powder is not so serviceable for small pieces, as that which is less, and in smaller grains. Though whether the smaller-grained powder be not more effectual in Cannons, than what is commonly used, I know not. certain it is that the lesser the grains are, the more powerful is the Powder: and yet, if the powder be not granulated at all, but in a subtile powder, it loseth its efficacie, and will scarce throw the Bullet beyond the muzzle of the Gun. These and other curiosities (many of which are touched upon by that learned Lithuanian, & by Kircherus, our Virtuosi might have taken notice of, rather than have digressed into those impertinencies with which he concludes his discourse of Salt-petre. Neither have I time to enlarge upon this Subject: nor is it my intention to carry this animadversion further, than to demonstrate to the meanest capacity, how ill some have written upon so noble, so common, and so necessary a Subject: and wherein they had such excellent helps from the writings of others, had not their ignorance bereaved them of those aids.

E I N I S.

*An additional Review.*

TO the end that no exceptions may be taken against what I say in relation to the *English Liturgy* by any of the *Episcopal Clergy* on the one hand ; or that the *Non-Conformists* may not derive any further prejudice against the *publique and established Worship* in this Nation : I do profess that I neither do hereby any way derogate from the *Liturgy* of the Church of *England*, neither do I think any man can justly condemn *Queen Elizabeth* for the course *She* took herein, but rather commend her most *pious* prudence ; what I say, is agreeable to what sundry *English Writers* say, that justify the *equitableness* of our *penal Laws* against the *Papists* ; it is conformable to what *Dr. Heylin* writes in his *History of the Reformation primo Elizabethæ*, and the words of *Mr. Hales* in his *Sermon preached at Pauls-Cross* are these :

Mr. Hale's  
Sermons, pag.  
57, 58.

And here I may not pass by that *singular moderation* of this Church of ours, which she most *Christianly* express towards her *Adversaries* of *Rome*, here at home in her bosome above all the *Reformed Churches*, I have read of ; for out of desire to make the breach seem no greater, than indeed it is, and to hold *Communion* and *Christian fellowship* with her so far as we possibly can, we have done nothing to cut off the favourers of that Church. The reasons of their love and respects to the Church of *Rome* we wish, but we do not command them to lay down : their *Lay-Brethren* have all means of instruction offered them. Our *Edicts* and *Statutes* made for their restraint, are such as serve only to awake them, and cause them to consider the *innocencie* of that cause for *refusal of Communion* ; in which they endure as ( they suppose ) such great losses. Those who are sent over by them, either for the retaining of the already perverted, or preventing others, are either return'd by us back again to them, or without any wrong unto their persons, or danger of their lives, suffer an easie restraint, which only hinders them from

dispensing



' dispersing the poyson they brought. And had *they* not been  
 ' stickling in our *State-business*, and meddling with our *Prince's*  
 ' *Crown*, there had not a drop of *their Blood* fallen to the  
 ' ground : unto our Sermons, in which the warnings of *that*  
 ' Church are necessarily to be taxed by *us*, we do not bind their  
 ' presence, only our desire is that they would joyn with *us* in  
 ' those prayers and holy Ceremonies which are common to *them* and  
 ' *us*. And so accordingly, by singular discretion was our *Ser-*  
 ' *vice-Book* compiled by our *Fore-Fathers*, as containing no-  
 ' thing that might offend *them*, as being almost meerly a *Com-*  
 ' *pendium* of their own *Breviary* and *Missal*, so that *they* shall  
 ' see nothing in our *Meetings*, but that they shall see done in  
 ' *their own*, though many things which are in *theirs*, here I  
 ' grant they shall not finde. And here indeed is the great and  
 ' main difference betwixt *us* : As it is in the Controversie con-  
 ' cerning the *Canonical Books of Scripture* : whatsoever we hold  
 ' for *Scripture*, that even by *that Church* is maintained, only *she*  
 ' takes upon *her* to add much, which we cannot think safe to  
 ' admit : so fares it in other points of Faith, and Ceremony;  
 ' whatsoever it is *we* hold for Faith, *she* holds it as far forth  
 ' as *we* : our Ceremonies are taken from *Her*; only *She* over  
 ' and above urges some things for Faith, which *we* take to be  
 ' Error, or at best but opinion; and for Ceremony which *we* think  
 ' to be *superstition*: So that to participate with *us*, is, though  
 ' not throughout, yet in some good measure to participate with  
 ' *that Church* : and certainly were that Spirit of *Charity* stir-  
 ' ring in *them*, which ought to be, they would love and honor  
 ' *us*, even for the resemblance of *that Church*, the beauty of which  
 ' themselves so much admire. Thus far Mr. *Hales*, with whose  
 sentiments my thoughts so correspond, that to justify the pro-  
 cedure of that renowned *Queen*, I add that *Her* action is war-  
 ranted by the deportment of the *Christians* from the *Apostolique*  
 and *primitive* times, to the revolution under *Constantine*, and  
 that I never read any thing in *Ecclesiastical History* relating to  
*Christianity*, to convince me that *Her demeanor* therein was un-  
 lawful, or unexpedient.

Where I speak of the Sweating-Sickness, to the accounts of

R

Polydore

*Polydore Virgil and Hollingshed, add this out of the Chronicle of Edw. Hall published by Richard Grafton Anno Domini 1550.*

*In the first year of King Henry 7. a new kind of Sicknes came suddenly through the whole Region, even after the first entring of the King into this Isle, which was so sore and painful and sharp, that the like was never heard of to any mans remembrance before that time: For suddenly a deadly and burning Sweat invaded their bodies, and vexed their blood with a most ardent heat, infested the stomach and the head grievously: by the tormenting and vexation of which sickness men were so sorely handled & so painfully pangued, that if they were laid in their bed, being not hable to suffer the importunate heat, they cast away the sheets and all the cloaths lying on the bed. If they were in their apparel and vestures, they would put off all their Garments, even to their shirts. Others were so dry that they draw the cold water to quench their importune heat and insatiable thirst. Others that could or at the least would abide the heat and stench (for indeed the Sweat had a great and strong savour) caused cloathes to be laid upon them as much as they could bear, to drive out the Sweat, if it might be. All in manner as soon as the Sweat took them, or within a short space after, yielded up their Ghost. So that of all them that sickned, there was not one amongst an hundred that escaped: Insomuch that beside the great number which deceased within the City of London, two Mayors successively died of the same disease within eight days, and six Aldermen. And when any person had fully and compleatly sweat 24 hours (for so long did the strength of this plague hold them) he should be then clearly delivred of his disease: yet not so clear rid of that, but that he might shortly relapse and fall again into the same evil pye; yea, again and twice again, as many one in deed did, which after the third time died of the same. At the length by Study of Physicians and experience of the people, driven thereunto by dreadful necessity, there was a remedy invented: For they that survived, considering the extremity of the pain in them that deceased, devised by things meer contrariant, to resist and withstand the furious rage of that burning furnace, by luke-warm drink, temperate heat, and measurable cloathes. For such persons as relapsed again into the flame after the first deliverance,*



verance, observed diligently and marked such things as did them ease and comfort at their first vexation, and using the same for a remedy and medicine of their pain, adding ever somewhat thereto that was sanative and wholsome. So that if any person ever after fell sick again, he observing the regiment that amongst the people was devised could shortly help himself, and easily temper and avoid the strength and malice of the Sweat. So that after the great loss of many men, they learned a present and speedy remedy for the same disease and malady, the which is this: If a man on the day time were plagued with the Sweat, then he should strait lie down with all his cloathes and garments, and lie still the whole 24 hours. If in the night he were taken, then he should not rise out of his bed for the space of 24 hours, & so cast the cloathes off that he might in no wise provoke the sweat, but so lie temperately that the water might distil out softly of its own accord, and to abstain from all meat if he might so long sustain and suffer hunger, and to take no more drink neither hot nor cold, than will moderately quench and delay his thirsty appetite. And in this his amending, one point diligently above all other is to be observed and attended, that he never put his hand or foot out of the bed to refresh or cool himself, the which to do is no less pain than short death. So you may plainly see what remedy was by the dayly experience excogitated and invented for this strange and unknown Disease, the which at that time vexed and grieved only the Realm of England in every Town and Village, as it did divers times after: but 55 years after, it sailed into Flanders and Germany, where it destroyed people innumerable for lack of knowledge of the English experience.

In the twenty second year of the aforesaid King, though the Sweating-Sickness did break out again, yet he saith that it did less hurt and displeasure to the people at this time, than it did before, by reason of the remedy which was invented by the death of many a Creature in the beginning. But in the subsequent years the Sweating-sickness is represented by him to be as direful, as others relate of it. But neither doth Hall, or any other Chronologer speak of this famous and almost infallible Medicine, what effect it had: so that we may conclude, that since it was impossible for the people to have been ignorant of

that remedy during those latter mortalities, the course it self must needs have been ineffectual.

Whereas I observe that the *Arcanum* of Ivy-berryes was no secret, however that Arcanist pretended it to be so; I prove it out of *Alexius Piedmontius* and others: I add to those Authors *Parkenson's Herbal*, a Book called, *A thousand Notable things*: and *Simon Paulli* professeth he was taught it by a Scotch Soldier. And that it may appear with how much more accurateness the receipt is in our Medicinal Books, than in the account of Mr. R. B. I shall set down the words of *Alexius Piedmontius*; and that the rather, because if the Receipt were so effectual as 'tis represented, (as I am satisfied it hath been at other times) 'tis necessary men should know how to use it.

*Alexius Piedmontius Secret. l. 2. pag. 92. ex vers. Latin. Weckeri Basilea 1563.* 'Præsentissimum remedium ad eos, qui  
'Peste correpti sunt; quod valet etiam ad lividas pustulas in  
'cute ex febre pestilentiali subortas: itemque ad carbunculos,  
'ignem sacrum, & id genus alia.

'R. *Hederæ* baccas, maturas, & in umbra siccatas, deinde  
'contritas, & fiat pulvis, de quo accipiant ægri ʒss. cum poculo dimidio vini albi, deinde maneant in lecto, ut optime  
'sudent. Posteaquam sudaverint ægri, indusium, linteamina  
'lecti, & stragula mutantur, siquidem fieri potest: sin minus,  
'indusium tantum cum linteaminibus. Atque sic aliqui una  
'nocte sola sani evaserunt. *Mediolanensem* quendam vidi ipse  
'*Aleppæ*, correptum peste, una cum bubone in inguinibus &  
'sub axilla altero, qui cum hoc pulvere bis in die, mane scilicet  
'& vesperi uteretur: sequenti die, bubonibus ruptis con-  
'valuisset.

The old MSS. Receipts to which I refer (there is a mistake in the year of that Plague in the Print, it being 1525. not 1540.) Give as much as will lie on a six-pence (or more) in half a glass of white wine, and direct to cover the party well and make him sweat: and they add, That some have taken of the said powder over night, and found themselves in the morning so well, that they have rose up, clothed themselves, and walked about the houses.



house, and finally been thoroughly cured. Probat. Ann. Domini 1625.

The *Treasure for English men*, or Receipts published in Th. Vicary (pag. 245.) Give a dram of the said powder tempered with two ounces of Planten-water, or white wine : and direct the Patient to sweate upon it as much, and as often as he can : and in using this for three or four days together, he will die or mend without all doubt ( by Gods help. ) This hath been often and truly proved. The Author of *A thousand Notable things* gives only half a dram with two or three ounces of Planten-water, and directs them to sweat, as *Alexius* doth.

Mr. Parkersson from the Lin-pericks, Quakers, and Chirurgeons, expresseth not the dose nor circumstances with which it is given ; but that it must be taken 2 or 3 days together. R. B. Of the usefulness of Nat. Phil. par. 2. pag. 142.

Thus they, whereas Mr. R. B. says only that in the Irish Plague, the *Arcanum* which cured such numbers ( and which he purchased by the exchange of another Secret ) was only a good dose of the powder of fully-ripe Ivy-berries, which did usually work plentifully by sweat. Here is neither an account of the Type, or quality of that Plague ; ( yet there is a great difference betwixt one and another, howbeit they go under one name : nor are they cured by one method. ) No relation of the dose of the powder, whether half a dram, one, two, or three drams : yet in the plague such sudorifiques as are otherwise used, are given in double quantity to what is commonly practised in lesser exigencies : and though it be said to work plentifully by sweat ; yet is there no directions that the patient be laid to sweat ; but, for all this saying, it might induce one that knew no more than this about *Arcanum*, to advise it only as such powders are given frequently to continue ( with other Medicines ) plain transpiration insensibly. In sum, there is not set down whether that our Irish Physician did begin his Cure with this powder, or with what Method he used it : and when all these Circumstances are added, ( without which the Receipt is useless ) though I am pleased to have read the happy success of it once, yet I dare not promise that it shall again, any more than Mr. Sprats almost infallible cure of the Sweating-sickness, or those other Anti-Pestilential Medicaments ( now exactly ) recorded by Experimental Galenists.

Whereas ( pag. 54. ) I speak of the age of Geber, as following

See Horringer  
Hist. Orient.

Bl. Manus  
Chronolog.  
Mathemat.  
Secul. 18.  
Andr. Libr.  
vins exam.  
conf. Parisiens.  
Vide Nsudz-  
um in histor.  
Magis. c. 14.  
Vide Riccioli  
Chronicon u-  
trumque præ-  
missum Alma-  
gesto novo.

Ad. Lib. v.  
exam. conf.  
Parisiens.  
Conring. de  
metac. Hermet.  
c. 7. pag. 380.

ing of *Leo Afer* in my judgment, and that he lived but one hundred years after *Mahomet*: and consequently many Centuries before *Raymund Lully*: the Argument I use is manifest to any man that knows the time of the birth of *Mahomet*, (which yet *Historians* fix to be, some *A. D.* 570. others *A. D.* 610. others in 620.) and that the *Hegira* begins *A. D.* 622. as *Vossius*. But I think it fit that I obiect here that as in all the *Arabian* Chronology, so in this particular about the age of *Geber*, there are great uncertainties. *Blancanus* placeth *Geber* (the *Arabian*) in the ninth Century after *Christ*; and so he must have lived about five hundred years before *Raymund Lully*. The inquisitive and learned *Libavius* reckons upon *Geber* as contemporary with *Mahomet*; saying, *Geberus quem volunt circa annum partus virginis sexcentimum in vivis fuisse*. I find that *Vigner* placeth him in the year of our Lord 723. *Ricciolus* calls him a Spaniard, *Geber Hispalensis* in his Chronicle of *Astronomers*, he placeth him in the year of our Lord 1090. and gives this reason against *Blancanus*, that it must be so, because that *Geber* in his *Astronomie* mentions *Arzachel* who lived in the twelfth Century after *Christ*, and whom by the name of *Arzael* is placed by *Blancanus* two Centuries after *Geber*, that is, within the eleventh Century after *Christ*. There is such a confusion in the *Arabian* names, that I am ready to imagine there were two *Gebers* (or more, the name being commonly assumed by the *Saracens*) the one very antient, and a *Chymist*; of whom *Leo Afer* may speak; and another in Spain, famous for *Astronomy*, who corrected sundry things in *Ptolomy's Almagest*, of whom *Ricciolus* and others speak, who call *Geber* a Spaniard. As for *Raymund Lully*, whom *Mr. Henshaw* placeth in the year 1333. I find *Libavius* to say he flourished sooner: *Illustris fuit Reimundus anno salvatoris 1324*, but *Conringius* relates how he was killed in the year 1315. *Lullius 1315. Octuagenarius circiter, dum religionem Christianam Bugia in Africa doceret Martyr lapidibus obrutus est*. From whence it is manifest, that if we place *Geber* in the twelfth Century with *Arzachel*, (as *Ricciolus* in his larger and more accurate Chronicle doth)

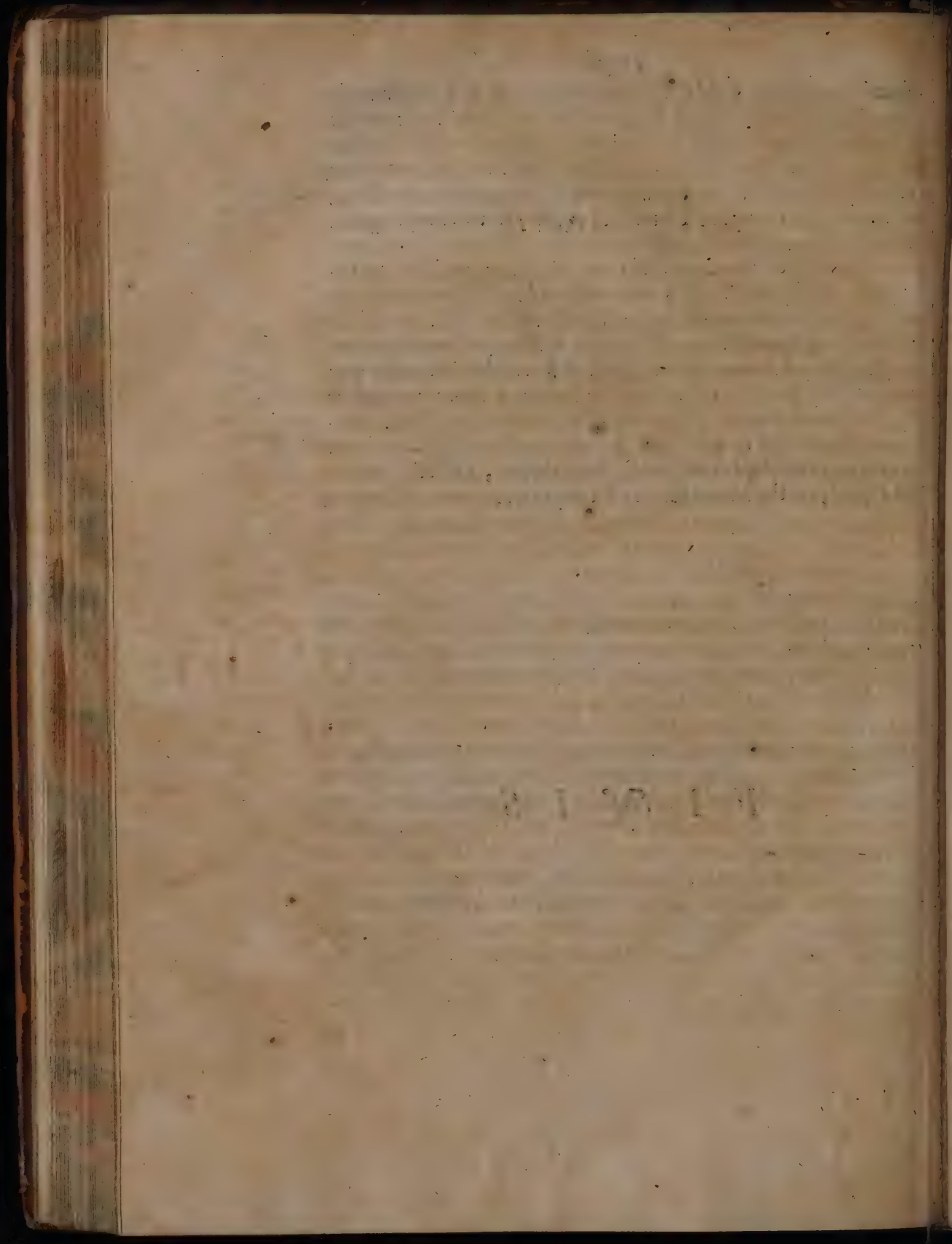
then



then it is a mistake in Mr. Henshaw to say that Geber for certain flourished some Centuries before Raymundus Lullius : and it seems evident that he mistook the Age of Lullius also. So that if I grant him to have been a Spaniard ( as I do not grant that Geber the Chymist was either a Spaniard, nor yet an Indian King, as some have thought ) I have still just reason to except against Mr. Henshaw.

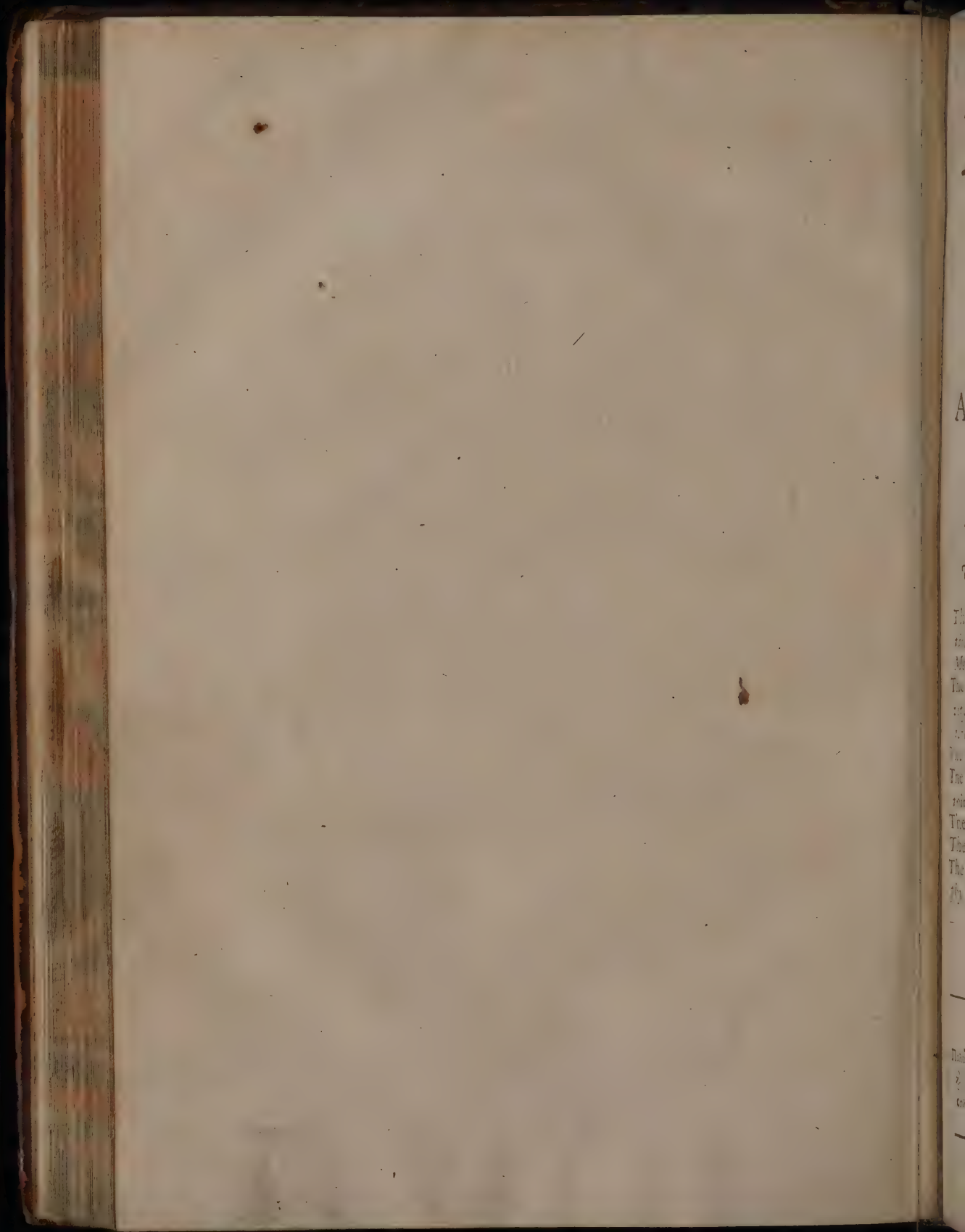
Where I say there are different Salt-Petres, perhaps according to the several Earths they are made : and to what I say about the Salt-Petre gathered of Lime-walls ; add, that since the writing hereof I have been where a new Cellar yeilded me a quantity of Peter on the walls : I observed that the taste was rather like the salt of calx viva, than of Nitre, yet did it burn without leaving any fixed salt at all. So that if Mr. Henshaw's friend had minded that, perhaps there might have been a considerable improvement deduced thence, either in order to Physick, or the Manufacture of Gunpowder.

F I N I S:











# THE PLUS ULTRA

reduced to a

## NON PLUS:

O R,

A SPECIMEN of some *Animadversions* upon the  
*PLUS ULTRA* of Mr. *Glanvill*, wherein sun-  
dry *Errors* of some *VIRTUOSI* are disco-  
vered, the Credit of the *Aristotelians* in part Re-ad-  
vanced; and Enquiries made about

The Advantages of the *Ancient Educa-  
tion* in England above the *Novel* and  
*Mechanical*.

The old *Peripatetick* notion of the *Gra-  
vity* of the *Air*, and the *Pressure* of the  
*aëreal Columnæ* or *Cylinder*.

The Deceitfulness of *Telescopes*.

The *World* in the *Moon*, and a *Voyage*  
*thither*.

The *Original* and *Progress* of *Chymistry*.

The *Use* of *chymical Medicaments*.

The *Usefulness* of the *Peripatetick Philoso-  
phy* in reference to the *Practice* of *Physick*.

The *Original* and *Progress* of *Anatomy*.

The *First Inventor* of the *Circulation* of  
the *Blood*.

The *Transfusion* of *Blood*, the *first Propo-  
sers* and *Inventers* thereof; and its *Use-  
fulness*.

The different *Nature* of the *Blood*, and the  
*variety* of *Phænomena* appearing upon  
the *burning* thereof, and *mixing* of it  
with *several liquors*.

Some *Trials* in order to a *discovery* of  
the *Nature* of the *English Baths*.

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By *Henry Stubbe*, *Physician* at *Warwick*.

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*Isocrates* in *Encomio Helenæ*,

Πολὺν ἴδ' ἀρετῆς τὸν ἐστὶ περὶ τοῦ χρησίου ἐπιμελὲς δοξάζειν ἢ περὶ τοῦ ἀχρηστοῦ ἀκριβὲς ἐπίσταται.  
καὶ μὴδὲν ἀποδέχεται ἐν τοῖς μεγάλοις ἢ πάλιν διαφέρειν ἐν τοῖς μικροῖς καὶ τοῖς μὲν πρὸς τὸ βίον ὠ-  
φελῆσαι.





*A* PREMONITION to the  
Ingenious and Considerate READER.

**A**BOVE a year ago, at the Table of a Person of Honour, there hapned a Debate concerning the Utility of the Ancient and Established Method and Medicaments used in Physick, and How much the knowledge of the Doctrine of Elements, Elementary Qualities and Humors, (as vulgarly delivered) might contribute to the skill and successful Practice of a Judicious Physician? There hapned to be present a Gentleman, very much concerned for the Promoting of Science, and a professed Admirer of the Institution of the Royal Society, who (as is usual with that sort of Virtuosi) instantly usurped all the Discourse, and avowed that All the Ancient Methods of Science were vain and useless to a Physician, and d.d not so much as contribute to the Cure of a Cut-finger. With this rash and hasty Censure I confess I was surpris'd, and demanding what knowledge he had in the received Methods of Physick and Medicaments? I found him altogether ignorant therein, but some crude Assertions of the new Philosophers, and some imperfect Experiments were alledged in behalf of Universal Inferences, and no less then Stupidity charged upon the precedent Philosophers and Physicians, with those that adhered unto them: In fine, He avowed that this opinion of his was the

a 2

positive

To the READER.

positive and dogmatical averment even to a syllable, of Mr. Glanvill and other *Virtuosi*, and that it was undeniably evinced in a Book of theirs about **The Modern Improvements of Useful Knowledge**. After a brief replie to this Insolent, shewing that the ancient Philosophy had not been so steril in reference to Physick, but that it had been the foundation of all those accounts of the Causes, Prognosticks, and Cures of Diseases (as also of the Healing of Cut-fingers and green wounds) by which of old and in latter times Patients had been benefited: that the nature of infirmities had been explicated, and the qualities and use of Medicaments, successfully explained upon those grounds: and whatever Defects there were in those received Principles; No Physician, that understood what he said, could deny them to be exceeding useful; that for any man to speak otherwise, was to expose himself to just scorn and contempt. As also for any man to go about to invidiate and discredit the present authentic Methods of Curing upon no other exceptions then those, that the Philosophy whereupon those Theorems were raised was false and frivolous, was an Intolerable Impertinence; since that even in Mathematicks it was notorious, that many solid Truths had been happily deduced from false suppositions and Postulata; that in Common Logick Right Conclusions might be the result of ridiculous Premisses; and the Rule of falshood in Arithmetick would alone serve to convince any man, that upon imaginary, yea, confessedly



TO the READER.

*sedly false Hypotheses, important and true deductions* might be judiciously continued. After that an end was put to this contest by a more general conversation, I still retained a sense of the Injury I supposed to be done to me and all Rational Physicians, by this barbarous Opiniatour; I determined to avenge my Faculty upon Mr. Glanvill for this, and by sacrificing that *Virtuoso* to publick Obloquy, thereby to establish (if possible) our general repose and tranquillitie, that we might not (as I observed we were) be troubled in all Companies and Assemblies, with Extravagancies of this kinde; there appearing unto me daily a greater necessity of securing our Eares with black wooll or Wax, against the Buzz and Noise of these Prattle-boxes, then ever *Ulysses* had upon his approach to the *Sirens*: Our ruine being as certain from them; and there being nothing of *Harmony* in such Discourses, nothing but discord and jarring, in comparison whereof the screeching of Owls, the creaking of doors, and whatever noise else is offensive, seemed Musical and Melodious. Upon the perusal of Mr. Glanvill's Book (which He had recommended unto me) I met with so much of Ignorance, that I wondered how several men should concur to mistake so, and I thought it a difficult matter to reply, it being too tedious for one of so little leisure as I have, to inform persons that were conceited and knew nothing.

How,

## TO the READER.

Howsoever, for the general benefit of the Age, I purposed to write some *Animadversions* upon him, and thereby to put a stop to the pride of such Ignoramus's, and amongst the several antiquated Philosophies which our Times have renewed, to introduce amongst the Virtuosi that of Pythagoras, the first rudiments whereof consisted in this, that **the Disciples were obliged for five years to hold their peace.** Upon the reading of Mr. Glanvill, I saw my self under a necessity of examining the History of the Royal Society, the tendencie whereof I observed to be so pernicious, that, if the first provocation had made me angry, I was now become obstinate. In that Famed Work I encountered with so many illiterate passages, that the credit of our Nation seemed concerned in the refuting it. I met with Passages so destructive, that, if to be concerned for the interest of the present Monarchy, the Protestant Religion, and the emolument of each private person (and not solely of Tradesmen) could warrant any one for putting Pen to paper, I ought not to be silent. I divided my *Animadversions* into several parts; some whereof were to represent these Comical Wits as really ridiculous; others were to make them odious to the Kingdom. I considered, that in these days few had patience to read over prolix Treatises; as also I imagined, that the Contest would be more deeply imprinted in the minds of men, if they were excited by a variety of discourse of that nature. The first Specimen of *Animadversions* upon Dr. Sprat and Mr. Glanvill were dispatched last Easter;



## TO the READER.

*Easter*; but the *Comical Wits* were so alarmed at what they at first *despised*, that they employed all their *Artifices* to divert me: and if *malicious threats* or other *disingenious proceedings* could have wrought upon me, the thing had died: But those *pitiful Mechaniciens* understood not the weakness of such Batteries upon me, and in all my life (which those mean spirits pretended they would write) I am sure there was never any circumstance could induce them to conjecture that I was to be discouraged by Menaces; Besides, having found them so ungenerous, I concluded it more unsafe to desist, then to proceed: I knew the cruelty of Cowards, and that who had to do with wolves, must not make himself a Sheep: I evidently saw designs not only upon my Fortunes, but Life; I know the pernicious Menacy of mean and proud spirits, the Obligation would be lost in sparing them; whilst the Ignominy was so great, to be at my Mercy: I concluded that the most daring Council was the best; that it was no disparagement for me to be overthrown by power, and that I should multiply shame upon them, when it should be said, I fell their Victour and their Martyr. Although I had submitted those papers to the most severe Judgment of a Cautious Person (giving him absolute liberty to dispunge whatsoever he thought harsh, or culpable) resolving never to look upon or alter them after he had viewed them; when they were authorised to the Press, and that there was no longer doubt of their Innocency, they containing nothing repugnant to the Government, Church of England,

TO the READER.

or Good Manners, yet did some of the *Virtuosi* (notwithstanding that they pretended to be desirous it should come out, and that rather than the Book should meet with any obstacle their President should licence it) procure the Impression to be stopped: If this be Generous, if this be agreeable to that frankness of minde and Philosophy which you profess; *Otres-haute*, and *tres-agreeable* Comediants, I appeal to all English and brave spirits! Could any man have perswaded the world, before this Essay, that you who seem the sole Dictators of Wit, and useful Knowledge; would have employed your power against me! And that thirty Legions were to be called to aid You against a young Countrey-Physician, who had so long discontinued Studies of this nature, and had so little time to resume them, or recollect his thoughts! Pardon me, if I tell you, there is nothing Noble in this demeanour, and whatever there may be of the *Virtuoso*, there is no Gallantry of Vertue will give countenance to it, nor any thing that derives from the Tutor of Alexander. Go, procure an Act of Parliament, or sollicite for a Proclamation, that none write or speak against you; by such means ensure those Triumphs over the ancient Education of this Kingdom, the two Universities, and the Protestant Church, which the Sprats and Glanvills by their Goose-quills cannot achieve for you. To this course I should willingly submit, and not envy you such accessions of Glory: And as a Supplement to the Lives of your Worthies, only write them impartially,



## TO the READER.

I give you leave to feign what you will concerning Me. Take not the advantage against these *Animadversions*, which the *Printers* mistakes occasioned: they are many, and since you were in part a cause of them, by distracting and impeding of the publication; and I being absent could not remedy them, 'twill be ignoble to press upon confessed errors, some whereof are reduced into a Catalogue. As to the incoherences of some places, and the incongruities of the *English*, I acknowledge there are sundry of that kind; but do not think my self accountable for those failures, nor for those repetitions of things, which as I travelled came into my memory; some whereof had been sent to London before. Howsoever, if you can refute the substance of the Discourses, I shall leave it to your prudence, after this declaration, how you will manage the controversy. When the other piece against Dr. Sprat will come out, is a matter I cannot well promise to the world: The *Virtuosi* can best undertake for that. I have respited the publication hereof thus long, to try, if any Letters of mine, or Entreaties might prevail with them: I joyned also Menaces that I would post them; which indignities I wonder men of To'erable Ingenuitie, or of so great arrogance would out-live. And the Theological Censure being already publick, I found the expectation of all men impatient to see some of these *Animadversions*.

There

## To the READER.

See *Campa-*  
*nella* of the  
*Spanish Mo-*  
*narchy*, in  
English, &c. 10.  
p. 47 & 25. p.  
157. c. 27 p.  
177, 180, 181,  
182, 183.

There is another Treatise, shewing the *Original* of the *Colledge of Experimental Philosophers*, as *Campanella* projected it, and containing a *parallel* of what *He* contrived (and their *Historian* hath pursued) for the reducing of *England* and *Holland* to *Popery*: also a *Specimen* of sundry *Experiments* published by several *Virtuosi*, that are *false* or *stolne*, yet boasted of as **their proper Inventions**: together with *Instances* of the *danger* that all *Tradesmen* will run into by the continuance of **this Assemblie**; which to manifest further, I shall here adde a *Proposal* designed to have been tendred, and improved into an **Act**, in this last *Session* of *Parliament*. It was delivered by *Sir P.N.* to an *Honourable Member* of the *House of Commons*, and by *him* sent unto me, adding,  
“In which you may see what **they drive at**,  
“viz. Instead of *Monopolizing* this or that  
“particular *Trade* at a time, once for all to  
“have a *Monopoly* for all that ever should be  
“invented.

“It is proposed, that such kinde of pre-  
“tended new *Inventions* relating to *Mecha-*  
“nicks, *Trades*, or *Manufactures*, as are or  
“shall be offered to the *Parliament*, may by  
“them be referred to such *indifferent judi-*  
“ous persons, as are like to give them a *faith-*  
“ful *Account*, about the *Newness*, *Reality*,  
Use-



To the READER.

“Usefulness, &c. of the things proposed,  
“and whether they are like to answer the ef-  
“fects pretended to, and to make Report of  
“the same to the *Parliament*.

“And the *Royal Society of London* for  
“Improving of *Natural Knowledge*, being  
“already fixed into a *Corporation*, and the  
“Council of the said *Society* consisting of 21,  
“being by their Constitution under an  
“Oath, to deal faithfully in all things be-  
“longing to the Trust committed to the said  
“Council: It is offered, that such things may  
“be preferred to the said Council, and they  
“to Report unto the *Parliament*.

They that know the *Men*, know their meaning: and  
whosoever understands the Constitution of our *Parli-  
aments*, is assured that they need not look out of  
their own number for indifferent judicious persons, to in-  
form the House what the *Reality, Usefulness, or New-  
ness, &c.* is of *Inventions*; or should the *Parliament*  
be at any time destitute of such *Intelligence*, the Coun-  
cil must make better Reports then doth their *Histo-  
rian*, or else it will be in vain to resort to them in the  
Case. Upon the same pretence, if they once gain  
this, that miscellaneous Assembly of indifferentlie  
judicious Persons, shall pretend to detect the  
*Frauds of Trades*; and endeavour to recommend all

## TO the READER.

*besitting* *Prefrments* in the *Univerfity* and *elſewhere*, the *ing nious* and *learned* : and *then* affairs will be brought to a *fair paſs*. But I enlarge too far, and ſhall only adde, that I do remit the *conſideration* and *purport* o this *Project* to the *Tradesmen* of *London*, who are better acquainted then I with the *tendency* and *conſequences* he. eof. Had my *Preface* to the *Animad- Verſions* upon the *History of the R. S.* come out firſt, I had there ſhewed that it is no way my *intention* by any of theſe *Pieces* to detract from any *Perſon* of *Quaa- lity* or *Learning*, that is an *Honorary Member* of that *Society*, not from the *Inſtitution* of it : I muſt re- ferre my Reader to that, as containing no ample *Ju- ſtification* of me, as alſo a defence of thoſe paſſages in my *life*, which I apprehended moſt obnoxious to their *cenſure*. My quarrellies only with the *Comical Wits*, who make ſuch a *Noiſe* in the world, that in them *all the reſt* are as it were *drown'd*, who have de- viated from the *intentions* of the *Royal Founder*, and are ſo *deſerted* by *ſober* and *ſerious* men, that I make it my further *Requeſt*, that they would inform us what *number* of *Perſons* are at preſent *actual Members* of the *Royal Society*, and *wh. ch* reſort thither, and pay the uſual *Contributions* : and that in their *Transactions* there may be related what *Perſons* are preſent each *Moneth* : from hence we ſhall be able to judge what *repute* they de- ſerve, and what *reſpects* we are to pay them.



# ERRATA.

Page 2 Line 31 blot out after Euclid p. 1. 13 read *vetustissimas* p. 4<sup>o</sup>. 35 r. *exactisque* p. 5 blot out the  
 Marginal note p. 9 l. 14 r. *ἐπιλέχοντα* ibid. l. 13 r. *diacelasteston* ibid. l. 34 r. *Methinks I already live in these*  
*times when the Virtuosi are as absurd as that Romish Monk* p. 12 l. 17 r. *cryptical* p. 14 l. 12 r. *Oderde* p. 15  
 l. 22 r. *Bagdad, Fez and Cordova* p. 17 l. 15 r. *indemonstrabile* ibid. l. 31 r. *rigorous* p. 21 l. 34 r. *Savonarola* p.  
 22 l. penult. r. *be very defective* p. 23 l. 3 r. *Anian* p. 28 in the Margin r. *Spherice cavum* ibid. l. 29 r. *none* p. 29  
 l. 19 r. *and thereupon* &c in the Marg. citation out of *Zucchi* l. 9 r. *vitiatas* p. 30 l. 26 r. *prius* p. 31 l. 2 r.  
*Sarsuis* p. 32 l. 32 r. *construximus* l. penult. r. *alids* p. 33 l. 8 r. *album* ibid. l. 17 r. *apparentiam* ibid. l. 17 r. *vi-*  
*rorum* ibid. l. 31 after *Telescopii* adde *afisunt* ibid. l. ult. r. *elicio* p. 38 l. 15 r. in p. 39 l. 5 r. *Jocantry* ib. Marg.  
 r. *peffum itura* p. 40 l. 31 r. *thorough three* p. 41 l. 20 r. *ēē* p. 47 l. 33 r. *tubis* Margin after *Discu* blot out the  
 full stop, and for p. 233 r. page 234 p. 48 l. 31 blot out perhaps p. 49 Margin r. *Mushe* a. ib. l. 20 r. *moſt Comi-*  
*cal Gentlemen* p. 52 l. 22 r. *natione Gracum* ibid. l. 27 r. *Genere* ibid. l. 31 for free r. *ignorant* ibid. l. ult. r. *Trakia-*  
*um* p. 56 l. 25 r. *utrorumque* p. 57 l. 2 r. *Freyſingenſis* ibid. l. 13 r. *capiendi* p. 59 l. 18 r. *πὸς* ibid. l. 20 r. *ἐπετα*, &c  
*Διαιρέσις*, &c l. 21. *πὸς* ibid. l. 31 r. *Mindergerm* p. 60 l. 19 r. *Theophrasto* p. 62 l. 10 r. *Sandaracham* ibid. l. 12.  
 r. *Thamyris* ibid. l. 14 r. *faces vini* p. 63 l. 19 r. *ueto Cadōvte* p. 66 l. 2 r. *Cordus* p. 67 l. 22 r. *aceſcat* ibid. l. 33.  
 r. *tonus* p. 69 Margin r. *Billich de ferment. ſect.* 89 p. 67 l. 16 r. *Noricatum. Inſtitutoriam* p. 77 l. 33 r. *Alcme-*  
*us* p. 80 l. 32 r. *verſates* p. 84 l. 17 r. *Oſteologiſtis* p. 88 l. 34 r. *quadrupedibus* p. 89 l. 3 r. *tentat* a. ibid. l. 9 r. *aliter*  
 in p. 95 r. *about* ibid. l. 135 r. *ſubclavian* ibid. l. penult. after *equals* adde *him* p. 97 l. 17 r. *medintely* p. 93 l. antepen.  
 for *who* r. *well* p. 106 l. 13 r. *alimentum* p. 113 for *indeclines* r. *rude lines* ibid. l. 32 r. *now* p. 117 l. 8 r. *the ſame*  
 ibid. l. 13 r. *about* p. 122 l. 12 adde *improſperous* before *eff. ſi* ibid. l. 19 for *and* r. *as* p. 124 l. 4 for *urine* r. *urin* p.  
 15 l. 20 for *them* r. *thence* ibid. l. 25 r. *crasſament* p. 153 l. 15 after *a* adde *Man* p. 154 l. 7 blot out *it* p. 155 l. 27  
 r. *in ſine* p. 156 l. 5 r. *dominio* p. 159 l. 18 r. *Delrio* p. 160 l. 29 for *or* r. *an* ibid. l. 37 r. *approched* p. 163 l. 6, 7, 8  
 blot out *which is demonſtrable from the variety of its declination and reſtitution* p. 163 l. 20 r. *Le-*  
*uity* p. 167 l. 23 after *therefore* add *wonder* ibid. l. 29 for *duo* r. *dice* p. 168 l. 6 before *were* adde *we* ibid. l. 9 r. *Ma-*  
*gnus* ibid. l. 15 r. *prægravata* p. 179 l. 1 r. *Marinus* ibid. l. 10 r. *granis* p. 174 l. 30 r. *volatum* l. 31 for *at* r. *et* p. 174  
 l. 2 r. *railery* ibid. l. 4 r. *scurrilia* ibid. l. 5 before *Council* adde *Provincial* p. 175 l. 27 r. *arkus* p. 178 l. 1 r. *Dama-*  
*geras* ibid. l. 2 r. *Cortes* ibid. l. 36 r. *cone* p. 179 l. 13 for *Philes* r. *Puls* p. 178 l. ult. r. *conſiſtence*.

These are moſt of the material *Errata* which I have had leiſure to take notice of: there are ſeveral of  
 the *Marginal Notes* and *Citations* which are not placed oppoſite to the places they refer unto; an  
 underſtanding Reader and Adverſary will eaſily judge thereof: and if any man take any advan-  
 tages from any probable *Errata* or ſuch like failiures as my haſte or the *Licensers* dafh may have  
 occaſioned, (tho' ugh not taken notice of here neither have I ever ſeen all the *Sheets*) I know not  
 how to help my ſelf if this *Premonition* avail me not.

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A  
SPECIMEN  
OF SOME

Animadversions

upon a Book, Entituled,

PLUS ULTRA,  
OR,

*Modern Improvements of Useful Knowledge.*

Written by

Mr. JOSEPH GLANVILL, a Member  
of the

ROYAL SOCIETY.

---

*Fr. Bacon de Verul. in Dedic. Sap. Veter. ad Cantabrigienses.*

*Æquum est tamen omnia vobis attribui, atque in vestrum honorem cedere, cum Accessiones quæque principiis magna ex parte debeantur.*

Mr. Sprat. Hist. R. S. pag. 317.

*It is but Reasonable, that the Original Invention should be ascribed to the true Author, rather than to Finishers.*

Hor. ep. l. 2. ep. 1.

*Ut primum positis nugari Gracia bellis  
Cæpit, & in vitium fortuna labier equa,  
Nunc Athletarum studiis, nunc arsit equorum,  
Marmoris aut eboris fabros aut æris amavit.  
Suspendit picta vultum mentemque tabella:  
Nunc tibicinibus, nunc est gavisa tragædis.*

---

L O N D O N,  
Printed in the Year 1670,

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TO THE  
Reader.

**T**HE Discourse of Mr. *Glanvill*, was the first occasion of my writing about the *Royal Society*, the provocation which it gave to all sorts of men, of different *Professions* were such, that it might stir up any publick spirit, to support so common a cause. I was sensible of the injuries he doth unto the dead, the affront he puts upon the living, the contempt wherewith he decries that *University-Learning*; and those *Studies* by which *Christianity* hath been supported against the *Arrians*, the *Jews*, the *Mahometans*, and of late the *Papists* and *Socinians*: and which if they be relinquished I profess, that I think that the *Christian Religion* must inevitably fall without the aid of a *Miracle*. It is a kind of *Apostacy* from the *Nicene* and *Athanasian Creeds* to flight *Metaphysicks*. The distinction of the *Trinity*, of *Essence* and *Personality*, the *Hypostatical Union* of the two *Natures* in our *Saviour*, and the *meritoriousness* of his death, (which depends *thereon*;) are undermined with *School-Divinity*; and whosoever hath any sense or value for the *benefits* we derive from *Controversial-Divinity*, either as to the quieting of his *Conscience*, or convincing of his *Adversaries*, must detest this Enterprize of Mr. *Glanvill*. And methinks that whosoever doth but call to mind that variety of foolish *Seets*, which gave the *Church* so much trouble in its first *Infancy*, and of late years, and considers that they had their *Original* from want of *Logick*, should not condemn that *Art*, by which men argue rightly from *sound Principles*. It was no less strange to me to finde the names of *Reverend*, *Sage*, *Grave*, *Disputer* and *Logician*, perverted into terms of *Contumely*; yet had not all those *Motives* prevailed with me, but that he had so defamed the *Ancient* and *Modern Physicians*, until those late *Innovators*, that many importuned me

to revenge my Faculty upon this Insolent Man. Besides, I had been much troubled with *impertinent discourses* of some, who to excuse their Ignorance in the *Prognostick* and *Therapeutick* parts of *Medicine*, indulged themselves in the vilifying all the *ancient learning* and *reading*, and asserting out of the *Writings* of the *Society*, the *necessity* and *conveniency* of *new methods*, in *curing* and *abbreviating diseases*. I soon espied my advantages over Mr. *Glanvill*. But perceiving his *Defence* so complicated, with the *History* of the *Royal Society*, that I could not well meddle with the one without reflecting upon the other; I set my self to peruse that also, and found the *Errors* therein so *numerous* and *gross*, and the *tendency* of it so *dangerous*, that it seemed but an easie, yet *necessary* work, to the *Universities*, and all *Learning*, as well as the profession of *Methodical Physick*, to write against these new-fashion'd *Philosophers*; I remarked so many *defaults* in both books, that I was at last weary of taking notice of them, there being still *Plus ultra*. I resolve to give my *Studies* no further diversion in pursuing Mr. *Glanvill*; but to leave him to the scorn of some more common *Pens*, who being at the *Universities* may have more leisure than I have at present. After all this *Ostentation of Learning*, the things he talks and writes of are such, as he is utterly unacquainted with: the Authors he mentions he never saw, and all his discourse about the *Mathematicks*, and *Mathematicians*, procured him no other acknowledgements from a *Learned* and *Reverend Prelate*, (to whom he sent one of his Books) than a *Reprimand* for Antermedling with what he understood not. Who can choose but smile when he reads how *Apuleius* improved the *Mathematicks* after *Euclid*? who ever heard of such men as *Maximus Palanudes*, *Achazen* and *Orentius*? I suppose this last should have been *Orontius*, and he is so famous a *Geometrician*, that when Sir *H. Savill* (as I remember) was to seek for an instance of a pitiful fellow; this was the man he fixed upon; He tells us that the most learned men of all sorts and professions; *Mathematicians*, *Chymists*, *Physicians*, *Anatomists*, *Antiquaries*, and *Philosophers*,

Plus Ultra.  
pag. 23.

Page 4.



phers, make up the *Royal Society*: but one would not guess so by their *History*! He tells us, that the former *Methods of Science* for so many *Centuries*, never brought the world so much *practical beneficial knowledge*, as would help towards the *Cure of a Cut Finger*, which he says is a *palpable Argument*, that they were *fundamental mistakes*, and that the *way* was not *right*. Can any one that hath heard of *Podalirius* and *Machaon* in *Homer* prate thus?

*Quos tamen Homerus non in pestilentia, neque in variis generibus morborum aliquid attulisse auxilii, sed vulneribus tantummodo ferro & medicamentis mederi solitos esse proposuit. Ex quo apparet has partes medicinae solas ab his esse tentatas, easque esse vetustatissimas.* Had our *Virtuoso* but known how *Hippocrates* had writ about *Wounds* and *Ulcers*, and that *Aristotle* himself was descended of the line of *Æsculapius*, and that his Ancestor *Nicomachus* was *Physician* to *Amyntas* King of *Macedon*, And that *Aristotle* also was a *Physician*, and writ several books (besides his *Anatomy of Man*) in that *Science*, and was upon that account valued by *Alexander the Great*, as *Plutarch* saith. And how little the *Ancients* stood in need of *modern discoveries* and *aids* to cure *Cut Fingers*, any man may judge, that knows what *Scribonius Largus*, and *Galen* (in his books *de Compos. Medicam. sec. genera*) have written: and how this last Author (upon *Philosophical deductions*) compounds several *Medicaments* to that purpose. In the *Augustane Dispensatory*, to this day his *Tripharmacon*, his *Diapalma*, his *Diadictamnium*, and others are recorded. And if any thing rendred *Paracelsus* justly famous, it was the cure of *inveterate Ulcers*, not *green Wounds*: and that therein he did out-doe the *ancient Physicians*, is a question, I cannot grant, and have not leisure to dispute.

Plus Ultra  
Pag 7. and 8.

Corn. Celsus  
in Praefat.

Diog. Laert. in  
vita Arist.  
Suidas in Ni-  
comacho, &c  
Ammonius in  
vita Arist.  
Vide notas  
Menagii in  
Diog. Laert.  
l. 5.

He reckons up *Five Instruments* by which the *latter Ages* have improved Knowledge above *Antiquity*. "The *MICROSCOPE*, *TELESCOPE*, *THERMOMETER*, *BAROMETER*, and the *AIR-PUMP*. Some of which were "first invented, all of them exceedingly improved by the "*ROYAL SOCIETY*. But as for the *Telescope*, he con-

Plus Ultra.  
Page 10.

'fesses that to have been invented by *Metius* and *Galileo*. Which Confession of his, although it take from the Society all pretences to the invention thereof; yet it is unbecoming an inquisitive person, who might upon better Intelligence from *Borellus*, in his book about the Inventor of Telescopes, published in 1656. He might have learned thence that *Adrianus Metius* of *Alkmaer* did not invent them, but one *Zacharias Joannides* of *Middleburgh* in *Zeland*, (though perhaps *Baptista Porta* had obscurely proposed it) and that he who may most justly come in for a second share in the glory of that invention is one *Joannes Lapreius* of the same Town. And whereas 'tis generally written, that *Galileo* was the first who applied those tubes to the contemplation of Celestial Objects, even that appears to be false, seeing that the first Inventor, even *Zacharias Joannides*, (together with his son *Joannes Zacharides*) did make use of them to discover several new Phenomena in the Moon and Heavens. Which mistake is unpardonable in our *Virtuoso* (and his Assistants) because that a more particular Enquiry hath been made of late years hereinto, then ever before. The *Barometer* he allows to have been first invented by *Torricellius*, not to try the gravitation of the *Aire*, but to prove a vacuum; Afterwards, the different ascent of the *Quicksilver*, being tried on the top and at the bottom of Hills in *France*, the opinion of the rising of the *Quicksilver* from the pressure of the *Air*, was introduced and illustrated. But nether is the gravitation, or pressure of the *Air*, a new opinion; it is as old as *Aristotle*, it is his, and he essayed to weigh the *Air*, in his book *de cælo* l. 4. sect. 29, 30, 39. He proves the *Air* to ponderate, because a bladder full of *Air* weighs heavier then one that is empty. Concerning which Experiment I shall adde the words of *Scipio Claramontius*, that learned Writer, the truth of it having been questioned, "*Possum tamen testari observationem Aristotelis dicto faventem, fuitque diligens observatio, & à diligentissimo pensatore, exactusque stateris & lancibus peracta, me presente & adistente, cum pluribus veritatis cupidis viris: pensitavimus ergo primum follem novum penitusque vacuum, primo statera quæ solum unciam differentiam indicabat, invenimusque*

*Borel de vero  
invent. Tele-  
scop. c. 12.*

*Pecquet, Ex-  
perim 2. in  
Diff. anat. p.  
54. Ed Paris.  
1651.*

*Scipio Clara-  
mont. de uni-  
verso l. 4. c. 3.*



"venimusque unciarum decemnovem, & totidem reperimus eun-  
 "dem follem diligenter inflatum, & solo spiritu nulloque hu-  
 "more immisso: ac postea usi sumus lance, quæ semuncias quoque  
 "indicabat, tumque follem inflatum unciarum decemnovem &  
 "semis invenimus, adeo tamen ut ibi libra in æquilibrio abs-  
 "que tractu (ut vocant nostri) adamussim permaneret: at idem  
 "vacuus non amplius in eodem signo sine tractu, sed cum tractu  
 "perstabat. Quocirca verum dicit Aristoteles. So that whe-  
 "ther we consider the gravitation of the *Aire*, or its being  
 "weighed, (which Mr. Glanvill in his *Plus ultra* thinks so  
 "strange of, as he expresses, "To have said in elder Time, That *Plus Ultra*  
 "Mankind should light upon an Invention, whereby those Bodies *P 59. c. 8.*  
 "might be weigh'd, would certainly have appeared very wilde  
 "and extravagant; and it will be so accounted for some time  
 "yet, till men have been longer, and are better acquainted  
 "with this Instrument, &c.) The opinion it self, and the  
 "attempt to weigh it, is *Aristotles*: Nor is this Discourse ca-  
 "sually proposed once in *Aristotle*; but sundry times he avows  
 "the gravitation of the Air in his *Problems*, viz. *sect. II. probl*  
 "*4. sect. 21 probl. 18. sect. 25. probl. 12, 13.* From hence we may  
 "judge how well Mr. Glanvill is acquainted with the *tenets*  
 "of *Aristotle*, and how well read he is in him whom he condemns.  
 "He and his *Philosophick* friends dealt only in some pitiful  
 "Compendium of *Physicks*, and from thence learned that which  
 "was the opinion of *Themistius*, *Simplicius*, and other eminent  
 "*Peripatetics*, as if it had been the avowed doctrine of their  
 "great Master; and thereupon they thus deliver themselves.  
 "And on this occasion, Sir, I observe the incompetency of their  
 "judgments, who are Enemies to the real Experimental Philoso-  
 "phy, in that they do not (as I intimated) at all, or very little,  
 "understand what they condemn. This I have some reason to  
 "say, since in the whole Compass of my Acquaintance, which  
 "is not very narrow, I profess I know not one who opposeth the  
 "Modern way, that is not almost totally unacquainted with  
 "it. And on the other side, upon the most careful turn of my  
 "thoughts among my *Philosophick* friends, I cannot light on  
 "one of all these that are for the free and experimental proce-  
 "dure, but who hath been very well instructed in the *Peripatetick*  
 "doctrines,

Many *Peripa-*  
*tics* (as  
*Claramontius*)  
 held that the  
 impure Air of  
 our Atmo-  
 sphere both  
 gravitate,  
 though they  
 deny it as to  
 the pure Ele-  
 mental Air.

Mr. Glanvill,  
*P. 122.*

Pecquet. Ex-  
per. Physico-  
Math. de Va-  
cuo. Pag. 50,  
&c. Paris  
1651.

Mersenni  
Phænomena  
Pneumat. pag.  
140. Par. 1644.

Plus Ultra  
c. 8. pag. 59

doctrines, which they have deserted, and most of them much better than those who are yet zealous Contenders for them. I might tell our Divine, that the Gravitation of the Air seems proposed in Job 28.25. *Qui fecit ventis pondus*, God is said to make weight for the wind: indeed neither the gravitation of the Atmosphere, nor the notion of Aerial cylinders, pressing upon subjacent bodies, were any News in the world when the Society was first established. But the News of the Barometer is so pleasant, that I will insert the whole passage.

“ But (IV.) The BAROMETER is another late Instrument, very helpful to useful Knowledge. That there is gravity even in the Air it self, and that that Element is only comparatively light, is now made evident and palpable by Experience, though Aristotle and his Schools held a different Theory: And by the help of Quicksilver in a Tube, the way is found to measure all the degrees of Compression in the Atmosphere, and to estimate exactly any accession of weight, which the Air receives from Winds, Clouds, or Vapors. To have said in elder Times, that Mankind should light upon an Invention whereby those bodies might be weigh'd, would certainly have appeared very wilde and extravagant; and it will be so accounted for some time yet, till men have been longer, and are better acquainted with this Instrument. For we have no reason to believe it should have better luck than the Doctrine of the Circulation, the Theory of Antipodes, and all great Discoveries in their first Proposals. 'Tis impossible to persuade some of the Indians that live near the heats of the Line, that there is any such thing as Ice in the World; but if you talk to them of Water made hard and consistent by Cold, they'll laugh at you as a notorious Romancer. And those will appear as ridiculous among the most of us, who shall affirm it possible to determine any thing of the Weight of the Wind or Clouds. But Experience turns the laugh upon the confident incredulity of the Scoffer; and he that will not believe, needs no more for his Conviction, than the labour of a Trial. Let him then fill a Tube of Glass, of some Feet in length, with Quicksilver;

“ and



"and having sealed one end, let him stop the other with his Fin-  
 "ger, and immerge that which is so stop'd into a vessel of Mer-  
 "cury, the Tube being perpendicularly erected; let him then  
 "substract his Finger, and he will perceive the Quicksilver to  
 "descend from the Tube into the subjacent vessel, till it comes  
 "to 29 Digits or thereabouts; there, after some Vibrations,  
 "it ordinarily rests. The reason that this remainder of the  
 "Mercury doth not descend also, is, because such a Mercurial  
 "Cylinder is just equiponderant to one of the incumbent At-  
 "mosphere that leans upon the Quicksilver in the Vessel, and  
 "so hinders a further descent. It is concluded therefore, That such  
 "a Cylinder of the Air, as presses upon the Mercury in the Vessel  
 "is of equal weight to about 29 Digits of that ponderous Body  
 "in the Tube. Thus it is when the Air is in its ordinary temper:  
 "but Vapours, Winds, and Clouds alter the Standard; so  
 "that the Quicksilver sometimes falls, sometimes rises in the  
 "Glass, proportionably to the greater or less accession of Gra-  
 "vity and compression of the Air hath received from any of  
 "those alterations; and the Degree of increase beyond the  
 "Standard, is the measure of the additionable gravity. —

There is something so charming and so divertive in this  
 discourse, that I cannot yet dismiss it, notwithstanding what  
 I have said out of *Aristotle* and *Claramontius*. That there is  
 gravity even in the Air it self, and that that Element is only  
 comparatively light, was of old made evident by the Man of  
*Stagira*: nor did the Schools hold a different tenet, if you take  
 Air for this impure mixture and *Sphæra vaporosa* about the  
 Earth, which we breath, and in a special manner have to do  
 with: as appears from *Claramontius* in his Book of the U-  
 niverse, and *Septalius* upon *Aristotle's Problems*. But Mr.  
*Glanvill* neither understands what he opposeth, nor what he  
 Asserts. For in the beginning he speaks of the gravitation of  
 the Element of the Air; whereas that Instrument called a  
 Barometer proposeth only a way to measure the degrees of  
 compression in the Atmosphere, in which Region I believe  
 no man ever denied but that the Aqueous and Terrestrial cor-  
 puscles interspersed had their weight and pressure: Thus  
 the ordinary temper of this Air (which is never pure) the al-

Averroes ad-  
 heres to Ari-  
 stotle, and  
 holds the Air  
 to be gravitate.

terations of it by vapors, winds, and clouds, are the subject of those contemplations, as any man knows that reads Mr. Boyle, or even Mr. Glanvill. Thus all the flourish of Rhetorick comes to nothing, the wonder is ceased, and we come to try only a more particular way of examining the weight of a body, which no man in his wits ever denied to be ponderous. And here I must tell our *Virinoso*, that his reading or consideration extends not so far as to the writings of Mr. Boyle, and the experiment in him. For it appears out of Him that the *Mercurial Cylinder* riseth and falls in the *Magdeburgical Air-Pump*, according to the lessening or vigorating of the *Spring of the Air*: and that upon putting in the *Barometer*, "and closing the *Engine*, there appeared not any change in "the height of the *Mercurial Cylinder*, no more then if the "interposed *Glass-Receiver* did not hinder the immediate "pressure of the ambient *Atmosphere* upon the inclosed *Air*; which hereby appears to bear upon the *Mercury*, rather by virtue of its *Spring* then of its weight. And if this *Phanomenon* proved such in a greater and less *Receiver*, with a greater or less cylinder of *Mercury* (it being indifferent which is used,) I doubt this *Barometer* will not determine the strength of the *Spring* of the *Air*, much less its weight. For the *Elasticity* is a distinct consideration from the weight of the *Air*: as when some *Experimentators* went about to weigh the *Pike*, the *Flownce* or *Spring of the Pike* was no part of the weight of the *Pike*, though it might turn the *Scales*. This sole consideration destroys all the great promises we have from the *Barometer*, for if the *Spring of the Air* cannot be exactly known, that we must be for ever ignorant of the nature of those other bodies which influence and press upon our *Air*, and compress the *Spring* of the *Air*, and may have many operations upon it which we know not, neither can comprehend; If the height of the *Atmosphere* cannot be determined, (which I make a *postulatum* of) the alterations in the higher *Regions* are unsearchable, and the *mechanismes* of those *corpuscular combinations* incomprehensible, I shall not doubt to say, that there is not yet found out a way to measure ALL THE degrees of Compression in the *Atmosphere*: nay, 'tis far from

Ex perim. Phyl.  
firo-echan.  
E. per. 7.

Besides, the  
differences in  
*Quicksilver* is  
such, that all  
Writers take  
notice of it,  
and I am apt  
to believe the  
*Phanomenon*  
may be much  
varied in the  
cylinder, ac-  
cording to  
that.



from that exactness; for the body of the *Quicksilver* varies not upon insensible variations in the *Air*: the intercepted *Air* in it takes off from the Niceness of the Experiment: and since even heat, (and perhaps other circumstances) adds to the Spring of the *Air*, it cannot give us that account pretended, about vapours, winds and clouds.

The Essay by Tubes and *Quicksilver*, as ingenious as it is, yields the Society no further glory, then to have illustrated it, and perhaps to have made some further Experiments in it then those had done, to whom, as the first Inventor, (by the concession of the Historian) appertains all or most of the Honour which ariseth from such accessions. It is true, our *Virtuosi* fixed on it the name of *Barometer*, but they had done better to have called τὸ ἔννεκα, or εὐτολέχεια, or *Gas*, or *Blas*, or *Diacetateston*, or some such unintelligible name, rather then have termed it thus: the Appellation signifying no more an instrument to measure the gravity of the *Air*, then an instrument to weigh a parcel of *Tarre*, or indefinitely a pair of *Stillyards*. The *Aerometer* might have been a little more *Emphatical*; especially considering that ἀερομετρεῖν and ἀδολεχεῖν are *Synonymous*. Had not *Aeroscopium* been accommodated to the *Thermometer*, it would not have been much incongruous. But I conceive, that *Aerobaricon* or *Aerostaticon* would have fitted the Experiment as well as any name I can now think upon. The *Barometer* was invented by *Torricellius* to prove a *Vacuum*, and in *Mersennus's Cogitata Physico-Mathematica*, you may find it applied to the examining the difference of the *Air* in several places. The *Air Pump* was found out at *Magdeburgh*, and not in *England*; it was first published by *Schottus*, under the name of *Instrumentum Magdeburgicum*. Mr. *Boyle* amended it, and prosecuted many ingenious Experiments in it, for which all Philosophers are redevable to him, but cannot proclaim him the Inventor of the Instrument, no, nor of the (notion of the *Elasticity* of the *Air*, which was proposed first to the world by *Henricus Regius*, under the name of the *spontaneous dilatation* of the *Air*: and illustrated by *Pecquetus*, who first, (that I know of,) spoke of the *Elater*, *Pecquetus* pag. 19 (quem elaterem nuncupo)

Hen. Reg.  
Philos Nat.  
l. 2 c. 2 p. 4.  
& l. 2 c. 3 p.  
173 ed. 10: 1.

Forcl u<sup>o</sup> su-  
pra c. 12. p. 26.  
Blancaeus de  
mundi fabr.  
part. 3. c. 2.

nuncupo). The Microscope was invented by the aforesaid Zacharias Joannides: The Thermometer, or Thermoscopia was first the invention of Sanctorius; so Blancanus saith, *Audiui Doctorem quendam medicum Patavii degentem, qui Sanctorius cognominatur, hujus esse inventorem* And now I demand of our Virtuoso, which of these Five Instruments for the Improvement of knowledge have been found out by the Royal Society: The Thermometer is the discovery of a Galenical Physician; but as to our Virtuosi nothing appears but the pretension to other mens discoveries, and the improving of them.

By the Benefit indeed of one of these Instruments, the Telescope, we are put in hopes to find a sure way to determine those mighty Questions, Whether the Earth move? or, The Planets be inhabited? And who knows which way the Conclusion may fall? — I perceive hereby that Mr. Glanvill is not altogether convinced that the Earth moves; and I am as little satisfied, that the solution of those Questions is so mighty and important a thing; for if the Earth stand still, then things will be as they are now: and if it be determined otherwise, yet shall we not need to fear that the Revolution of the Earth in its Diurnal motion, either shake our houses about our ears, or shake us off by the tangent line: and as for those inhabitants of the Planets, in case all our other trading should be lost, we shall not finde out any gainful commerce with them; nor need we dread that they will piss out our Eyes as we look up. So that let their Telescopes be brought to that unimaginable perfection, whereby to discover the inhabitants of the Planets as plainly as mites in Cheese, and let the Conclusion fall which way it will, things will fall out no otherwise than they do.

He inveigheth bitterly against Aristotle for his Heathen-Notions, and in his Preface to the Clergy of B. & W. wishes that the devoted Admirers of Aristotle would study his Rhetorick, History of Animals, and Mechanicks. I wonder he did not recommend unto them the perusal of his Ethicks. Certainly they deserve as much to be read in these days, as any Piece.

And



And perhaps his *Politicks* might contribute something to the instruction of a *Nation*. But how dare here commend any book of that man of *Stagira* to be read, if those motives that swayed him to *Anti-Aristotelism*, be of any *validity*: Alas! he is troubled at his *Heathen-Notions*! Oh! rare *Puritanism*! But my dear Brother *Scruple*, ought any one to be offended at every thing that is of *Heathen-Original*, though it contain nothing of *Gentilisme* in it? Represent your adversary as you please to his *Diocesan*, nothing hath more of the *Presbyterian* and *Fanatick* then this *Topick*. Moreover, what do you think of those *Atoms* and *Corpuscles*? are they not *Heathen-Notions*, and decried by the *Fathers*? what do you think of the terms used by the *Mathematicians*? what of the *Langnages*, such as are not *Sacred*? what of the months, days of the year, and the names of the *Stars*, *Constellations*, &c. Must every thing be reformed according to the *Coelum Stellatum Christianum* of *Julius Schillerus*? Besides, these words in *Theology*, of *Unity* and *Trinity*, have as much of *Heathenism* in them, as they have of *Platonism*. I shall here take further notice of his *exceptions* against *Aristotle*, as they are *Recapitulated* here (though they are more largely proposed by him in his *Letter* against *Aristotle*, which I have fully answered in a distinct *Treatise*) the *generall censure* whereof is, That they are nothing but *Lies*, and such as no man that is acquainted with any thing of *ancient Literature* could have uttered. I protest in the *Presence of Almighty God*, that if there be not great care taken, we may be in a little time reduced to that pass, as to believe the story of *Tom Thumb*, and all the *Legends* or *falsifications of History*, which the *Papists* obtrude upon us! This *Philosophy* fairly disposeth us therevnto, by taking us off from the *Pedantism* of *Philology*, and *ancient reading*, and by accustoming us to believe the *forgeries* they obtrude upon us. Methinks herein he is one as absurd as that *Romish Monk* was in the *Pulpit*. *Heresbachius* l. C. citante *Taubmanno*, *audivi*, inquit, *Monachum in Ecclesia declamantem*, qui, *nova*, inquebat, *jam reperta est Lingua, quæ vocatur Græca, ab hac sedulo cavendum: Hæc enim est quæ parit*

omnes

7. H. n. H. t.  
tingerus in  
Smegn. Ori-  
ntal l. 1. c.  
1. p. 2

*omnes istas hereses. Ea lingua est liber proditus, in manibus passim habetur & vocatur N. I. Plenus hic liber rubet, & viperis. Alia etiam oritur lingua, quam vocant Hebraeam, hanc qui discunt, efficiuntur Hebraei.* We are running on as fast as we can to this condition of ignorance, and shall be so injured to *Historical* untruths, *magisterially* imposed upon us, and disused from inquiring into *them*, as to *believe any thing*. He tells us the *Aristotelian* Philosophy aims at *no more*, than the instructing men in *Notion* and *Dispute*, that its *Design* was mean, and its *Principles* at the best uncertain and precarious, — One may guess how well our *Virtuoso* understands the *Old Philosophy*, to ascribe that unto it all in general as its aim, which is but the intendment (and that a necessary one too) of the *Dialectick* and *Metaphysical* parts. In *Natural Philosophy* their designs were the same that our *Moderns* boast of, if they miscarried in the *main*, let us pity their misfortunes, but not blame their intentions. Did *Aristotle* in his books of *Animals*, or *Theophrastus* about *Plants*, instruct men only to *Dispute*? Had his *Anatomy*, and his *Problems* nothing but *Notion*? Must we cast off all *Notions*? Or ought we to endeavour after the gaining of *clear notions of things*? If men hitherto did proceed no further, and yet pretended to be *Peripateticks*, blame the *abuse*, but condemn not the *Philosophy*, which hath nothing in it that puts a stop to *Enquiries* and *Curiosity*. Nor do I find that those *Physicians*, and others, who advanced the several parts of *Natural Philosophy* and *Physick*, did thereby act contrary to the rules of their *Master* or *Tutors*. It is true, that their *Schools* did meddle but with few points mainly, and those were such as related to *Divinity*, as the *Eternity of the World*, the *Nature of the First and Second Causes*, of the *Soul and its Faculties*, &c. as to an exact *natural Philosophy*, they did not much trouble themselves, nor had we had what we have, but that *Averroes* and the *Physicians* befriended us. But must *Scaliger* and such like suffer under these *Imputations*, which particularly relate unto their *School-Divines*? and must they also be blamed for not teaching nor putting men upon further *Enquiries* than were necessary to that *Christianity*, which they were

to



to support against the *Mahometans* and *Jews*? He that knows the end of *their* first institution by *Charlemagne*, can best judge how *prudential* it was, and how they answered *expectation*. But our *Illiterati* know nothing of *that*, and are always reviling *them* where they are not *faulty*, and would have had them neglected that part which was *necessary* to the *Education* of all that were to live *under* and *support* *Christianity*, to pursue *Studies* that contribute *little* thereto, and such as were never *essential* to the being of a *State*, but have been often exploded as *prejudicial* thereunto. The same *Apology* may serve the present *Universities*, who do enough in breeding up men to be fitly qualified for *Employments* in *Church* and *State*, and instruct them in so much *Philosophy* as is necessary for the explaining and defending of our Religion against *Atheists*, *Papists*, and *Socinians*: and whosoever shall put the *accurate* debate of these *Points*, the *Art* of reasoning, the *Validity* of *Consequences*, the unfolding of *cryptical Syllogisms* and *Fallacies*, the general doctrine of *Topicks*, the *Moral Philosophy*, and *Foundations* of *Civil Prudence*, (besides *Civil* and *Ecclesiastical History* and *Languages*) which are taught there, or ought to be by their *Constitution*, into the *Scales* on one hand, and the *Mechanical Education* (recommended with all the advantages that ariseth from *Aphorisms* of *Cider*, *planting* of *Orchards*, *making* of *Optick Glasses*, *magnetick* and *hortulane Curiosities*) on the other hand, will be able to judge easily which *Studies* deserve the *most* encouragement by the *publick*, and which are *most* *useful* and *requisite*. Having said thus much in behalf of our *University-Learning* (which is now *contradistinguished* from the *Mechanical Education*) I shall adde thus much in favour of our *Ancestors*, who gave solemn encouragement to *Archery*, *Cudgel-playing*, *Foot-ball-playing*, and other *Exercises*, that prepared the *Vulgar* to *Military Performances*; as the more *Academical* did the *Gentry* to *State-affairs*: whereas they gave little countenance to the *Experimental Philosophers* and *Naturalists*: that the practice is justified by *Vegetius* l. 3. c. 10. *Quis autem dubitat artem bellicam rebus omnibus esse potiore, per quam libertas retinetur, & dignitas propagatur, provincia conservantur & Imperium*

See Mr Sprat,  
p. 329.

*Inferium? Hanc quidem reliſtis deſerinis omnibus Lacedæmonii, & poſt coluere Romani. Hanc ſolam hodieque Barbari putant eſſe ſervandam: cætera aut in hac arte conſiſtere, aut per hanc artem aſſequi ſe poſſe conſidunt. Hac dimicaturis eſt neceſſaria, per quam vitam retineant & victoriam conſequantur. But to return to our Virtuoso! Are not the principles of Des Cartes,*

*and the figured Atoms of Gaſſendus as precarious as thoſe of Ariſtole, and leſs ſubjected to ſenſe? Have not the Chymical principles ſo much of uncertainty, as they have of Equivocation? Are not they precarious too, and ſuſpicious? Are there any of thoſe that agree amongſt themſelves? and do not they as little agree with Nature as thoſe of the Peripatetick way? I will not doubt to maintain*

Analogicè ſi accipiantur. hæc Chymicorum principia aſſentiri eis poſſumus, ita ut pro Mercario aqua ponatur, Sulphure ignis & aer, Sale terra. Analogiâ negatâ negatur omnia coabire. Ex aqua & terra faciliſſimum viſcidum, & hunc cuius conglutinari & conſeſcere in lapidem: quemadmodum natura in fieri videmus. Si hic reſolvatur in ultima non in Mercarium, Sulphur, & Salem, ſed in vulgata & Phyſica reſolveretur principia. M. Ruland. Progymn. Alchym. Qu. 6.

that as far as *Phyſick* is concerned in the debates; The ancient *Philosophy* better agrees with the *Phænomena* of Nature, and carries us on with more aſſurance to work (as they phrase it) then any other, and that the diligent reading of *Valleſius*, *Mercatus*, *Saxonia*, *Claudinus*, &c. ſhall produce better *Phyſicians* then *Sylvius*, *Helmont*, or *Odorode*. And whoſoever reſolves any of the other *Questions* in the *Negative*, whatever he pretend, hath never conſiderately ſtudied the *Points*. Give therefore the *Ariſtotelians* leave to hold an *Hypotheſis*, which is accommodated to the polity of our Nation) at leaſt as revocable, till a better be introduced; and do not proceed in an exterminative way, till ſomething elſe be ready to be ſubſtituted.

If *Notions* might be rejected for being firſt propoſed and uſed by *Heathens*, then is not *Ariſtole* in a worſe condition then *Epicurus*, *Democritus*, *Plato*, or *Pythagoras*; If *Impiety* in the Teacher may authorize us to reject doctrines not *impious*, I think the condition of our *Stagirite* not to be worſe then that of other ancient *Philosophers*, and better than ſome of the *New*. That there is *impiety* enough in *Gaſſendus's* Answer to *Des Cartes*, any *Chriſtian* will grant, eſpecially if he be a *Proteſtant*. And the lie of *Des Cartes* had



had but little of the *Saint*: this is manifest. And I desire Mr. *Glanvill* to acquit *Paracelsus* from being *impious* in his life, and many of his *doctrines*. If he was a *Corrupter* of the *Wisdom* of the *Ancients*, for *mis-citing*, and *misrepresenting* their opinions; and must therefore be condemned and rejected: who can approve of Mr. *Sprat*, Mr. *Glanvill*, and their *Adherents*? He saith, that *Aristotle* was of no such *superlative Account* in the *wisest* times. But he tells us not which those *most wise* times were, when he was in *disesteem*. I have not read of any more wise people, then *Greece*, *Rome*, and the *Mahometans*, under their first *Caliphs* and King *Almansor*. And yet all these admired him at several times. He that chargeth *Philip* of *Macedon*, *Alexander* the Great, and his *Successors*, (particularly the *Ptolomyes* of *Egypt*;) with *Folly*; and *Sylla*, *Tully*, and those other *Romans* that admired him, with want of *wisdom*; Or, who thinks that the *Empire* of the *Moors*, and their *Academies* at *Bagdad*, *Fez*, and *Cordula*, were composed of a sort of *Simpletons*, may go seek for the *wise* and the *prudent* in *Gotam Colledge*. And perhaps those *Christians* that celebrated *Aristotle*, and advanced him to that *repute* in their *Kingdoms* and *Universities*, were not *Idiots* or *Changelings*. That *He was much opposed and slighted by the first Fathers*, is an *Objection* that hath some truth in it, but not much to the *particular prejudice* of our *Stagirite*. For at first they hated and detested all *humane Learning*, and *Philosophy*; and when they came any of them to admit of those *Sciences*, then they divided into the *Aristotelians* and *Platonists*, as they did into *Arians* and *Catholicks*: That the *Arians* were *Aristotelians*, is to me as evident, as that *Mahomet* taking the advantage of that *faction*, and of the *brutal* lives and *ignorance* of the *Catholiques* depending upon the *Patriarch* of *Constantinople*, did advance the *Sect* of *Christians*, called *Mahometans*; and his *Successors* the *Caliphs*, did

C

wholly

I cannot find any ground to conclude *Aristotle* so wicked. If we indemnifie him for having an hand in poisoning *Alexander*, (which perhaps is not true). In his last Will, there is much generosity: in his life, many testimonies of a singular virtue: in his discourses much wit and worth. He writ an *Apologie* for *Piety*; got the walls of his destroyed Country to be rebuilt, and made excellent *Laws* for it. *Philip* chose him to breed up *Alexander*. And those are greater assurances that he was not so wicked, as he is reported by his adversaries. They repeat nothing but old lies, such as *Apellicon* refuted: and *Aristocles* saith, *οὐδὲν πρὸς τὸ κακόν*. See *Cassanbon* upon *Diog. Laert.*

I desire that the *Virtuosi* would enquire after the *Peripatetick* Philosophy, at *Alexandria* after the *Ptolomies* and not at *Athens*. And when they have done that, and studied the condition of *Christianity*, during the time of the *Arrians*, and enquired into the rise of *Mahomer*, the circumstances that advanced him, and contributed to the spreading of his doctrine, and increase of that Empire under the *Caliphs*, then they will be able to judge of the truth of what their *Historian*, and Mr *Glanvill* writes in the books animadverted on, and in his Letter concerning *Aristotle*.

wholly employ themselves to improve the doctrines of *Aristotle* and the *Peripateticks*. So that *Aristotelism*, *Arianism*, and *Mahometanism* issued out of the same parts of the world, viz. *Alexandria*, and the adjacent Countreys: Nor was it Chance or the black ignorance of the Age, but great prudence in *Charlemaine* and his Successors in the West, that brought in *Aristotle*; as any man will say that un-

derstands the circumstances of those dayes. But so much History is above the reach of my *Experimental Philosopher*: To supply that defect, *Christians* must be once more told, that since their minds are enlightned with the rays of the glorious Gospel, they have less reason to bow down to the Dictates of an Idolater and an Heathen. And so farewell to the *Rhetorick* and other works of *Aristotle*, which our *Virtuoso* a little while agoe recommended unto us. Let us shake hands with *Seneca*, and *Epicetus*, and *Plato*: and joyn with *Tertullian* in that saying, *Nobis Philosophia opus non est post Jesum Christum, nec Aristotele post Evangelium*. Having said thus much to these grand accusations against *Aristotle*, with which Mr. *Glanvill* was so perplexed, I suppose he may think that a more devout Admirer of *Aristotle* then I am, with more time, may say enough to convince him, that it was his fault, and not the *Peripateticks*, that he benefited so little by them. And I pray what language did *Epicurus*, *Pythagoras*, and *Philolaus* make use of? He writ better about divine things than *Plato*, as *Vossius* witnesseth, *Quaquam multa de Deo scripta sunt a Platone, accuratius tamen apertiusque de iis egit Aristoteles*. He cites a passage of *Plato*, ο θεός γεωμετρῆς, and adds, that the Universe must be known by the Art, by which it was made. If it be not to be known any other way, it is unintelligible. Let him answer Dr. *Moré's* Dialogues upon that point, where he explodes the Mechanism of Nature: and reckons upon *Des-Cartes* as the most prodigious Fool that ever was, for holding that opinion. I shall adde, that *Geometricians*



*tricians* are commonly a sort of men, that being once got out of *their Science*, they are far from being elevated and improved thereby: And the reason is, because that the severe procedure of *Mathematical demonstrations*, and *their ways* they take to demonstrate things appertaining to *their Science*, these do not qualify a man at all for those *argumentations* which sway and guide in *Metaphysics, Ethics, Politics* and *Religion* it self. Upon this account *Aristotle* observed, that a child might become a *Mathematician*, but not a *Politician*, or *Moralist*. Hence it is, that *Geometricians*, (except their studies have particularly acquainted them with those *Dialecticks*, which regulate the generality of Mankind in such discourses,) seldom, if ever, prove *Metaphysicians, Religious*, or otherwise of tolerable *ratiocination*: either rejecting as false, frivolous, and indemonstrable, those reasonings and studies, according to which humane affairs are regulated; or else ignorantly, running into *Whimsies*, and phantastical ways of arguing. Neither is this more manifest, then I think these two Conclusions are, which I deduce from thence in opposition to some *Comical Wits* in their *History*, viz.

*Arist Eth. l. 6. c. 8.*

That by how much more general as to *publike* and *private use* and *emolument* in order to *domestick* affairs, or *Civil* *rudence* and the preservation of *Humane Society* and *Government* those things are, which depend upon *perswasive Arguments*, and those *topicks* and methods of *ratiocination* which are laid down by *Aristotle*, not *Euclide*: by so much those courses ought to be pursued, upheld and encouraged by understanding *Statesmen* which are *subservient* thereunto, above the less necessary and *inutile Mathematicks*.

Next, That the *Mechanical Education*, or that whereby Youth are inured at first to *vigorous demonstrations*, and necessary deductions from *evident Principles*, and a *Philosophy* that is purely *Corpuscularian*, ought not to be premised or preferred to other studies in order to the fitting men for *humane life*: seeing either *accidentally*, (yet so, as in regard of our *depraved nature* it is almost unavoidable) or *intrinsically* those courses dispose mens minds afterwards to *Atheism*, or an *indifference* in *Religion*, and *inhabilitate* them towards those more

*Hist. of the R. S. p. 319.*

important, but less delightful studies of Law, Policy, and Religion, with their several dependencies.

I finde that Aristotle hath complained of some, that in their Explications of Nature made too much use of Geometry. Magrenus hath complained also of them; and Contrinius, Ballialdus, and Ricciolus, of Kepler; and Bodinus, in his *Theatrum Naturæ* l. 5. and all Physicians almost of Des-Cartes his ridiculous book *de Homine*. And if Plato was so solicitous, that none but Geometricians should come into his School, yet he sent them very fools out, if they allowed of his Logick and Physiology. I shall leave the further defence of Aristotle to others; only I must tell him, that Vossius in his account of Geometricians allows of Aristotle for no mean one. And we find that he supposeth his Scholars not ignorant in Geometry, since without that knowledge they could not understand his Analyticks, nor that part of his Ethicks, where he illustrates Justice by the Arithmetical and Geometrical proportions. And as for his Ethnical opinions, it is ridiculous to upbraid the University-Learning with them, since they are not taught, but solidly refuted there, However if Aristotle must suffer on this Account, let not Epicurus triumph. He tells us that Archytas, that great Geometrician was scared from Mechanical and Organical Methods to the great hinderance of beneficial Improvements that way, so that he kept himself up in Abstractive Contemplations. I cannot finde any such thing in his life written by Diog. Laertius, but the contrary, ἐτὼ πρῶτον τὰ μηχανικά ταῖς μηχαναῖς περὶ χρῆσάμεν ἄρχαῖς ἐμεθώδευσεν, καὶ πρῶτον κινήσιν ὀργανικὴν διαγέγραμματα γεωμετρικῶς περιήγαγε. He made a Pidgeon of wood artificially to flie. So Favorinus. Ἀρχύτας τὰ ἐργατῶν φιλόσοφος ἁμα καὶ μηχανικὸς ὢν, ἐποίησε περιττεράν ξυλίνην, πέλομένην ἥτις ἔποισεν καθίσαιεν, ἐκέτι ἀνίστατο. I wonder oftentimes how He did to commit so many mistakes; and I cannot believe that He or his Philosophick friends were ever well instructed in the Peripatetick doctrines, who are so ill taught in all manner of Humane Learning. I resign him up to

Vide Ricciolum in Almagest. lib. 1. c. 4. p. 278.

See Mr. Parkers censure of the Platonic Philosophy.

Vide Blaucanum in loca Mathematica Aristotelis.

Epicurus Mathēsin in super habuit: unde ut Plutarch. ait libro contra Epicurum. Philosophum quendam nomine Apellem, eo nomine laudabar, quod ab adolescentia nunquam esset contaminatus disciplinis Mathematicis. Vossius de Philos. &c. 8 f. 27.

Diog. Laert. l. 8. in vit. Archytæ.

Collins x. 12.



to be the scorn and entertainment of others henceforth.

Nor will I engage particularly in the dispute betwixt him and Mr. Cross. I am informed, that the *Relation* is very false; and I profess I have no mind to believe this *Virtuoso* in any thing he says. It is easie for him to misreport a private discourse; His great and admired friend Mr. Sprat relates general Encounters false; He tells us, "Of a mischance

"that befel the Christian Army in Egypt in the time of the Holy Warre. Their strength was great and irresistible, if Hist. of the R.S. Pag. 412.

"they had only understood that which every Egyptian could have taught them, the course and the time of the overflowing of the Nile. For the want of that slender knowledge,

"the bravest men of all Christendome, were led up to the Neck

"in the River, and were forced to yield to the Enemies conditions without striking a stroke. This was occasioned by the

"stupidity of the Cardinal who commanded them. If he had

"been less skilful in the Schoolmen and more in Nature, that

"dreadful disaster had never happened. — Such an untruth as

the Historian tells here, such perhaps is the Narrative of

what passed betwixt him and Mr. Cross. I cannot finde any

such Story in *Fullers Holy Warre*, but the contrary, viz. "E- Fullers Holy War, l 3. c. 27.

gypt is a low level Countrey except some few advantages, which

"the Egyptians had fortified for themselves. Through the midst

"of the Land runs the River Nilus, whose streams they had so

"bridled with banks and sluices, that they could keep it to be their

"own servant, and make it their Enemies Master at pleasure.

"The Christians confidently marched on, and the Turks per-

"ceiving the Game was come within the mile, pierced their

"banks, and unbruzzling the River, let it run open mouth upon

"them, yet so that at the first they drowned them but up to the

"middle not to the neck. There is no body charges the

Cardinal Pelagius, who was Legate, and commanded the Ar-

my there, for invading Egypt in an unseasonable time, nor

wich being ignorant of the time when Nile did overflow.

The Christians were not ignorant of that, who had discovered

and invaded Egypt before in 1218, and this was but two

years after in 1220. The Egyptians, 'tis true, dammed up

the River (which was now low) and upon the approach of

the

the Cardinal cut their banks, and so gained the victory. That the Cardinal was no Souldier, and unacquainted with Stratagems of war, I grant; and for this Historians condemn him, but not for being ignorant of that part of *Natural Philosophy*. A Member of the *Royal Society* published lately an account of the *Original of Nile*. The Description had nothing of News in it to any Scholar, that was material. But they should have procured an account of the manner of the inundation of *Nile*, for the *Historian* is more ignorant then the *Cardinal* of it. Had it been the time of the beginning of the overflowing of *Nile*, they might have retired easily to

Prosper. Alp.  
pin. de Medic.  
Ægypt l. 1. c. 8.

*Damiata* without damage; for it never exceeds in rising above ten inches each day, sometimes it ariseth not eight

I know not what Logick Mr. Glanvill read at Oxford, but 'tis Ignoratio Elenchi in him, to oppose what Mr. Cross might say about *Asia* as twas of old named, and bounded, and travelled over, with the new discoveries of *China*, *Japan*, &c. which rather constitute a fifth part of the world, then are included in *Asia*. That is *Asia*, which they imported that gave it the name, not what others affix to it. By the same Sophistry it may be said that the former Kings were not Kings of France, because late Conquests have enlarged the borders.

Nor was Aristotle implicitly guided by the relations of those Hunters, &c. he diligently inquired into their reports, and oftentimes refutes the vulgar stories. See this particularly asserted by *Federicus Bonaventura de partu Octomestri* l. 1. c. 6c.

*Apionem*, was deceived as well as Mr. Cross. *Solinus* also c. 14 and *Ammonius* in the life of *Aristotle* say, that *Aristotle* did accompany *Alexander* in his *Asiatick Expedition*. And I profess my self in an errour as well as Mr. Cross, if it be not true, that *Aristotle* had sundry advantages to pen his *History of Animals* which our *Virtuosi* want. *Pliny* Nat. Hist. l. 8. c. 16. saith, *Alexandro Magno rege inflammato cupidine animalium naturas noscendi, delegataque hac commentatione Aristoteli, summo in omni doctrina viro, aliquot millia hominum in totius Asiæ, Græciæque tractu parere jussa, omnium quos venatus, aucupia, piscatusque alebant: quibusque vivaria, armenta,*



*menta, alvearia, piscina, aviaria incurant: nequid usquam gentium ignoraretur ab eo: quos percontando, quinquaginta ferme volumina illa præclara de animalibus condidit.*

Let a man now consider the greatness of *Alexander*, the impatience he had to effect his purposes, how generous he was in acknowledging Services, and how vindictive when neglected, and how understanding to know what was done and omitted: Let any man consider this, and he will think that *the Society* have not a Patron that interesteth himself so much as *Alexander* did for *Aristotle*. He had several thousands commanded to give him intelligence: their number transcends any that ours can pretend to: their quality is such as the *R. Society* wisheth for, viz. Intelligence from the constant and unerring use of Experienced men, of the most unassisted and most unartificial kinds of life. And if notwithstanding all these circumstances *Aristotle* were abused or mistaken, or defective in his Narrations, I am confident there is less credit to be placed in the Narrations of some of our *Virtuosi*, who have been so mistaken in their Accounts of *Cider* and *Salt-Peter*, domestick Enquiries; what man will give himself the trouble to inform *them*, either at home, or abroad? with what negligence and imperfectness will they register things? how un-philosophical will their *memoires* be? How will they be able by intreaty to procure a second information? That there are more parts of the world discovered and sailed unto then in *Aristotles* time, I grant. But what certainty shall we have of Narratives picked up from negligent, or un-accurate Merchants and Seamen? What judgement have these men of no reading, whereby to rectify or enlarge their Enquiries? Mr. *Glanvill* doth not so much as know who writ well upon the several subjects, in which he pretends that the *Moderns* have out-done the *Ancients*. As Improvers of the History of *Bathes* (by the way we are far inferiour to them in the practice of *Bathing*) he reckons *Savanarola* for one: he might as well have recounted *Bayrus*, *Gordonius* and *Gatinaria*: or any of the barbarous Physicians, for advancers of the practice: He might have told us of a Volume of Writers *de balneis*: But why did he omit *Soliman*

Mr. Sprat. p.  
257.

*wander de thermis*, *Libavius*, and our *Dr. Jordan* (who lived at our *Bathe*) and *Baubin* *de fonte Bollenfi*, and the other Writers about particular *Bathes*? Alas! He knew them not: nor did I ever hear any man commend *Blanchellus* upon that subject. About Minerals, could he not have named *Encelius*, *Casalpinus*, *Faltopius*, and *Lazarus Erkerus*, whom I find by some to be preferred before *Agricola*? In his Account of remote *Histories of Nature*, could he remember the Author of the *Caribby-History*, and pass by *Carolus Piso*, *Burggravius*, and *Bontius* about *Erasile* and the *East Indies*. So where he speaks of discoveries made by *Microscopes* (pag. 57.) by naming only *Dr. Power* and *Mr. Hooke*, ingenious *Mechanicks*, Members of the *Royal Society*; he seems to intimate, as if none but the *Virtuosi* had proceeded in that adventure, whereas *Petrus Borellus*, Physician in ordinary to the King of *Erance*, published a *Century of Microscopical observations An. Dom. 1656.* such as have (if true) more of utility then those of *Mr. Hooke*, though less of curiosity, and destitute of *Cuts*; and *Kircher* after many years employed in those contemplations, *per exquisitissima Microscopia*, did publish several Experiments of that kinde, in his book *de Peste*; and *Nicolaus Zucchi* about the same time (1656.) published a short account of *Microscopical observations*, about a *Louse*, a *Flea*, the feathers of a *Peacocks tail*, &c. encouraging others to prosecute the work. He tells us, (pag. 56.) "that the discoveries by *Telescopes* may inform us of the *Longitudes*: upon which mult needs ensue yet greater improvements of *Navigation*, and perhaps the discovery of the North-west passage, and yet unknown South. I grant that the invention of *Longitudes* will be extreemly beneficial to man-kinde in point of sailing: and the *R.S.* have made great boasts how that it shall be achieved by their *Members*; and thereupon caused some projects to be rejected, which yet perhaps would have proved as unfeasible as the attempt of *Galileo's*, to calculate it by the *Medicean Starrs*. I desire much to see the happy result of our *Virtuosi*, though the consequences here affixed to it, as *Improvements* was very defective. I shall propose some *Scruples* about the *North-west passage*, and

*Kerck. de P. st.*  
*sect. 1. c. 7.*

*Nic. Zucchi*  
*Philos. optic.*  
*part. 2. tr. 3. c.*  
*7. sect. 4. p.*  
 348.



and the utility of its discovery, as also of the hopes of finding out the *Southern Tracts*.

First, I say that the story about the Streights of *Aman* is very improbable, if not certainly a *Fiction*. It hath been so thorowly search'd into by our Nation, that there is no encouragement to a further trial: and this Streight of the *North-west* passage, is indeed nothing but a narrow difficult passage to *Button's Bay*, the entrance being properly called *Hudson's Streight*, in regard of his first finding it; the mouth whereof lies in 62 degrees. But were there such a passage, it would much more concern the *Portugals*, and the *Spaniards*, and *Dutch*, then it doth the *English*; for their trade is to the *North-part* of the *East-Indies*, and ours to the *South*: theirs to the *Moluccoes*, *Philippinas*, *Japan*, and *China*; whereas we seldom pass beyond *Bantam* in *Java*.

Secondly, were there a passage that way, yet it were not to be chosen before the other: for, could a man sail in a strait line, first from *England* to the Streight, and thence from the Streight to the *East-Indies*, it would prove a further way then the other by the *Cape of good Hope*. But those that know any thing of those Seas, know that the Sea-Course to any part of *North-America*, is as low as 23, 24, 25, or 30 the highest by reason of the winds which bloweth in the *South-sea* East and West, as well as in the North, that is to say, for the most part West without the Tropicks, and almost constantly East within them. Wherefore you must go out of your way as well from the North-part of *America* to the *East-Indies*, as from *England* to this supposed Streight: and there is as much difference in relation to pleasantness in the Voyages, as between Summer and Winter. For when one is clear of the Bay of *Biscay*, in all the Voyage by the Cape you find no cold weather till you return to the same place again: but on the contrary, it is so cold and icy about the Streight in the middle of Summer, that there is no making way without much difficulty and trouble. And in the *South-Sea*, where the Sunne keeps the same course as in the North in June; Sir *Francis Drake* in compassing the world, found so much cold in thirty eight degrees of North-lati-

See Mr. *Gardiner* in his description of *America* 25. where he p. 6. telleth to write nothing but what is own knowledge, or good intelligence put into his hands, and long in the remote parts of *America*: the loss of whole large accounts thereof we may deplore.

Judge hence what hopes there is of making discovery in the *Southern Tracts*.

tude, that he was forced into a *Southerly* course. Besides, if one may take a conjecture from the *windes*, which have blown when the Undertakers for that discovery passed into those *Streights*, one would guess by their *great coldness*, that they did *blow from the Land*, and consequently that there is no Sea to the North of *America*, but that the Land of this *New World* reacheth by the North parts, even to the Northwardly Provinces of *Tartary*, &c.

I am surprized to finde, that Mr. *Glanvill* doth not make the *Moderns* to surpass the *Ancients*, in *Architecture*, *Sculpture*, *Picture*, and several other Arts of *ingenious Luxury*. That he doth not advance the glory of our *Mathematical burning-Glasses*, above the *Specula Ustoria* of *Proclus*; and the *Artificial Fires* of our *Virtuosi* above those invented by *Callicinus*, when he burned the *Saracens Fleet*.

But not to upbraid him with what he hath omitted: I shall resume the discourse about *Telescopes*, and their *fallaciousness*, wherein if Mr. *Cross* was a little doubtful, yet Mr. *Glanvill* is so assured, that he makes an ample recital of the contest, and the advantages he gained in it. I shall set down his words, the better to divert my Reader, and to shew how insupportable such kind of men are in all judicious and intelligent company.

Mr. *Glanvill's*  
Plus Ultra. c.  
9 p. 65.

"To my Discourse about the *Dioptrick Tubes*, the *Telescope* and *Microscope*, the Reverend Disputer replied, [That "our Glasses were all deceitful and fallacious] Which Answer "minds me of the good Woman, who when her Husband "urged in an occasion of difference, [I saw it, and shall I not "believe my own Eyes?] Replied briskly, will you believe "your own Eyes before your own Dear wife? And it seems "this Gentleman thinks it unreasonable we should believe ours, "before his own dear Aristotle.

"For an assurance of the credit of those Glasses. I told him "he might try them upon objects near, and easily visible by the "unassisted sight; and if he made the trial, he would finde "they altered the objects in nothing but their proportions, "which are represented larger for the advantage of vision in "things small and remote; and we have all the like reasons to  
distrust



" distrust our Eyes, as these Glasses (for their informations  
 " are the same in all things, but the mentioned difference) and  
 " there is no man so much a fool as not to make allowances  
 " for that. Never was any yet so grossly deceived by the Micro-  
 " scope, as to be perswaded that a Flea is as big as a Lobster;  
 " nor did the Telescope ever make any one believe that the  
 " Moon was at the end of his Tube: But if the former repre-  
 " sents that little Creature as bristled and jamar'd, and the o-  
 " ther makes the Planet mountaneous and uneven, we have no  
 " reason to believe but that their reports are sincere, though  
 " our unaided Senses are too gross to perceive either the one  
 " or other; since, if the mentioned bristles and jamars are  
 " in the Glass, and not in the Animal, they would appear in  
 " like manner in all the small Creatures which in the same  
 " light and position are look't on through the Microscope:  
 " And if the ruggedness of surface were in it, and not in the  
 " Moon, the same would be seen upon all other distant Ob-  
 " jects, that are view'd through the other Optick Instrument.  
 " And if there be deceit in those Glasses, Seamen had need  
 " beware how they trust them, since the Flags which appear  
 " to be those of their Friends in the Perspective, may be re-  
 " ally the Colours of their Enemies.

" Upon these Accounts, Sir, which afford plain and sen-  
 " sible evidence, I wondred much at the *insinuating* strange  
 " suspicion, which had been scarce pardonable in a vulgar head;  
 " and I know not what to call it in one, that would be  
 " thought a Philosopher: But the wary man gave a reason,  
 " which made me as much wonder at his Argument, as  
 " his Doubt. And to this attend Ye Philosophers of the ROY-  
 " AL COLLEDGE, and prepare your selves to answer a  
 " Demonstration from Experience against your Glasses; Raise  
 " your Expectations for a wonderful, convulsive Experiment;  
 " Let the Mountains travel, and the Birth will follow. [Take  
 " two Spectacles (saith the Experimental Sage) use them  
 " at the same time, and you will not see so well as with one singly.]  
 " therefore your Microscopes and Telescopes are Impostors.  
 " This man, Sir, is a Logician, and no doubt you perceive so.  
 " O how I admire this rare faculty of arguing! How dull are

“our *Wits*, to those *subtile*, *Eagle-ey’d* *Schoolmen*, who see  
 “*Conclusions* so far off, through the more *unerring* *Telescopes*  
 “of their own piercing *Understandings*? Did ever *old man*  
 “before make *this* use of his *Spectacles* But to leave won-  
 “dring, let’s endeavour to understand this *Philosophy* of  
 “*Chue*. How a man may see by *Spectacles*, that *Perspectives*  
 “are *deceitful*. [*We can see better through one pair, than two*]  
 “saith the *deep* *Philosopher*. Most *sagely* observ’d! The  
 “*Argument* begins *strongly*: But in the name of *Aristotle*,  
 “whence comes the *Consequence*? Therefore *Perspectives* are  
 “*fallacious*.

“One Proposition for Sence,  
 “And th’ other for Convenience.

“This fits his purpose to discredit *new Discoveries*, ’tis no  
 “matter how it follows. This Gentleman, you must know,  
 “Sir, useth to have his *word* taken among his *admiring* *Neigh-*  
 “*bours*, and so is not wont to be put to the trouble of *pro-*  
 “*ving*: but I was so *unmannerly* as to expect it, chusing *ra-*  
 “*ther* to see with mine own *Eyes*, than his *infallible* *Spe-*  
 “*ctacles*. *We can see better* — saith the *Disputer*. How  
 “doth he know that? If *Perspectives* deceive us, though  
 “*naked sense* witness for them, Why may not his *single* *Spe-*  
 “*ctacles* be as *deceitful* as they? These represent things *big-*  
 “*ger* than they are to the *unaided sight*; and the *Philosophi-*  
 “*cal Glasses* do but the *same thing*, in a *higher degree* of  
 “*magnifying* the *Object*. But we allow him the benefit of  
 “his *single Spectacles*, though he will not be so courteous to  
 “our *Glasses*, and confess his *Reverend Experiment* of the  
 “*use* of *two*, but are *inquisitive* about the *Consequence*. The  
 “*Reason* of which certainly must be, (if any be intended in  
 “it) that our *Telescopes* and *Microscopes* have a *Glass* at each  
 “*end*, which the *Dan* of *Surrence* thinks answers the two  
 “*pair* of *Spectacles*, and therefore must render the *Repre-*  
 “*sentation* *deceitful*. If this *Philosopher* had spared some of  
 “those thoughts to the *profitable doctrine* of *Opticks*, which  
 “he hath spent upon *Genus* and *Species*, we had never heard  
 “of



"of this *Obj-ction*, which is as much a reason against the credit  
 "of all *Perspective Glasses* whatsoever, as the *Philosophical*  
 "ones he would discredit. And without more *Opticks* than  
 "those of *natural Understanding*, he might, if it had pleased  
 "him, have known, that we see better through the *two Glas-*  
 "*ses in Perspectives*, then any *single one*; because they are  
 "so fashioned and ordered, that the *visive rays* are better ga-  
 "thered and united by them for the advantage of sight: But  
 "in the *two Spectacles*, the case is contrary. These things  
 "I suggested, and some others from the *Dioptricks*, in which  
 "this *Sage Person* was pleased then to conceal his Know-  
 "ledge; and how great *that* was in these matters, will ap-  
 "pear by the *Learned Problem* he proposed at this period of  
 "our Discourse, [*Why we cannot see with two pair of Spectacles better than with one single? For, saith the Par of a Rhomb, Vis unita fortior?*] A pleasant piece of *Philosophy* this; And I'll shew the *Disputer* how strongly he infers from his *Maxim*, by another Question like it. Why cannot he write better with *two Pens* then with a *single one*, since *Vis unita fortior*? When he hath answered *this Quare*, he hath resolved his own. I said in the Discourse, That the reason he gave why one would expect it should be so, is the reason why 'tis not; and this is plain enough to sense, from the confusion of *Vision*, which shews, that the rays are not united after the way requisite for the aiding the sight (as I just now intimated) and how that should be, I had here shewn, but that I am ashamed to adde more in earnest about a grave foolery. —

Upon this Discourse, the first *Remark* I shall make is, That Mr. *Glanvill* hath little or no insight into *Opticks*, and is in a manner as ignorant in that profitable Science, as he represents his *Adversary* to be. It is something for a Man to be able to give an account how he spent his time, though about *Genus* and *Species*; rather then to appear to have idly pass'd it away, without acquiring any knowledge at all. The solution of Mr. *Cross's* fallacy, if it were his by that *Inter-atory*, *Why cannot he write better with two Pens, then with a single one?* is ridiculous, since there is no *vis unita* there:

and

Vtrum S. haricē earum, dilatando radices  
 iper ipsum transmissos amplificat notabiliter  
 umaginem, si in debita distantia constitua-  
 Post Spharicē convexum. Zucchi<sup>us</sup> phil  
 o. 2. p. 2. r. 2. c. 7. sect. 5. pag. 360, 361, 362.  
 How it is in Telescopes made up of all con-  
 vex-Glasse, the same Author shews there:  
 and so doth K<sup>aplan</sup> in his Dioptricks.

Zucchi<sup>us</sup> phi-  
 los. opt. part. 2.  
 tr. 3. c. 7. sect. 5.  
 p. 358.

and in one sort of Tubes, though the rays be united in the first convex Glass, and brought to a Convergency, yet must the Spherical Cavity of the next Glass dilate again, and dispose them fittingly to effect the expected vision in the Retina: and besides this, it is requisite that the Tube be so fitted unto the eye (not to speak of the fitting it differently according as the Medium is) as to exclude all other impressions and radiations; that may divert and impede the sight, viz. *Ad consulendum sufficienti determinationi potentia per languidiorem & angustiore impressionem a remotioribus, multum prodest, si ex forma instrumenti & ejus applicatione ad Oculum vel ex conditione loci & quo per instrumentum remotiora, & in minori amplitudine apparentia prospiciamus, impediuntur radiationes aliunde intra oculum simul & semel diffuse, præsertim valide.*

As to what Mr. Cross is said to have argued against Telescopes, that the addition of one Glass to another must hinder rather than improve vision, because that the superadding of one pair of Spectacles to another, rather weakens then amends the sight. I must say, that whosoever understands the forming of an Argument cannot except against the form of that, nor do the Propositions cohere so ill together, as that one should be as it were for sence, and other, for convenience. All that excursion of our Virtuoso shews his Ignorance, not Mr. Cross's. 'Tis one thing to except against the form, another thing to except against the matter of a Syllogism. I confess there is reason enough for to do the latter; but none for the other procedure. I believe such a dispute was never heard of since the declining of Arcadia, as this was: If Mr. Cross did urge this otherwise then to try the Intellectuals of Mr. Glanvill, (concerning whose inkability he might be well satisfied) there is no defence to be made for him, otherwise then that he was unacquainted with a sort of knowledge which is unnecessary in a Divine, and not expected from him; whose credit is better supported by those Qualifications which represent him as a man of godly Conversation, faithful and able



in the discharge of his Gospel-Ministry. But that Mr. Glanvill as little understood the subject of a knowledge he pretends unto, it is manifest from hence; that he might easily have denied the Assertion of the Spectacles, that two pair did not impede, but amend the sight in some eyes that are very weak. I know a young Gentlewoman that hath two Cataracts breeding in her eyes, which reads and works with two pair of Spectacles, whereas she cannot with one pair. There is also an old Gentlewoman of my acquaintance who useth the same helps. I am ashamed to debate these fooleries (as our Virtuoso calls them,) but if Mr. Cross did call in question the integrity of the Telescopes, I shall assume the liberty of a digression about that Point, which perhaps may not seem unseasonable in this Age, and which will abate the pride, and evince the great ignorance of Mr. Glanvill.

Either my Memory doth very much deceive me, or else the Lord Bacon did suspect these Telescopes, that they might impose upon our Senses: and I am sure Mr. Boyle is in the same Errour with Mr. Cross, for he complains that when He went about to examine those appearances in the Sunne called Macula, and Facula solares, he could not make the least discovery of them in many months, which yet other Observators pretend to see every day: yet doth Mr. Boyle profess, that He neither wanted the conveniency of excellent Telescopes, nor omitted any circumstance requisite to the Enquiry. Besides these, Scipio Claramontius, he that baffled Tycho about the Comets in the judgement of most men, and gained advantages enough against Kepler and Galileo to make himself glorious, and to shew that instead of Mathematical demonstrations they proceeded upon uncertain Topics and Probabilities: this learned and inquisitive person doth avowedly suspect the Telescopes as fallacious more then once, and that there are more then He of that judgement, is a thing unquestionable by any but Superficial Scholars: nor do I apprehend any other reason then this to be in their

Tentam. Phys.  
philos pag. 144.  
145, 146.

Vide Ricciol.  
Aim. et Nov.  
l. 8. sect. 1. cap. 6.

Scipio Claramontius in defensione Anti-Tychonis, & libri de novis stellis à se conscripti Italico idiomate edita, multis contendit Telescopium in representatione objectorum fallax esse, *Part. 2. c. 15.* ex quibus inferre c. 16. ei qui velit apparentias coelestium per illud exceptas ratas haberi, necessariò ostendendum esse à nullà aberrationum, quibus illud obnoxium est, hujusmodi nitidas esse. Quare cum ex una parte assumi nequeat, quasi universaliter verum quicquid per Telescopium representatur; ex alia

heads.

partem non possit talis proposito universalis restringi ad apparentias cœlestium, sine manifesta petitione principii, cum hoc ipsum sit quod controversatur; an fallaci de se instrumento observata in cœlestibus pro certis habenda sint? manifeste sequitur nihil ex usu Telescopij constitui posse de dispositione cœlestium. Zucchius Philos. opt. part. 1. c. 17. sect. 2. p. 175.

heads, who have till this day employed their thoughts here to contrive new Glasses, and amend defects in the former. Our *Virtuosi* have complained of an *Irre* in their Glasses, and gone about to correct that by *Turning* of them; but a friend of mine

writes, that he imagines it was after that *Eustachio Divini* at Rome had given them an *hint* of it: and then they found it out. A little more modesty in *Assertions* of this kind would become our *Wits*, considering that affairs of this nature (it is the opinion of *Archimedes*, and refers to all *Mechanisms*) admit not demonstration. Cum neque visus, neque manus, neque instrumenta per quæ experiri oportet, satis habeant fidei ad exquisitam demonstrationem. — *Archimedes*, in libro de *Arena*.

I shall not so far engage in the controversy, as to repeat the *Arguments* and *Replies* on both sides. It seems *strange*, that the *Telescopes* should so magnify thirty, forty, or one hundred times objects on earth, and yet lessen those of the fixed Stars in Heaven, viz. *Stellas primæ magnitudinis, Caniculam, &c.* Jovem, Saturnum minores representat multo, quam oculo libero appareant; & idem instrumentum *Stellas* nusquam apparentes, ut Jovis *Satellites* justæ magnitudinis representat, & paulo minores representato Jove, imò tantas facit, ut possint plus apparere, quam queant apparere stella primæ magnitudinis, — at quid? in *Octava Sphæra* *Stellas* nihil apparentes magnas facit, *Nebulosas scilicet, & Galaxiæ formatrices*. — This is granted all by *Galileo* to be true, but he solves by an imaginary irradiation, the fancy whereof he advanced upon some weak *Experiments*, most whereof he deserted himself, and the rest are excellently refuted by *Zucchius*, who introduceth another *Salvo* from the configuration of the Eye, and that part of it called *Uvea*: which perhaps may be discovered to be as false as any of the other hereafter: but he adds, Ex quo est, ut in facilitate detrahenda circumfusa sideribus radiationis sit notabile discrimen inter Planetas collatos inter se, & inter *Stellas fixas* invicem, & aliquas earum cum aliquibus eorum comparatas.

Scipio Claram.  
mont. de uni-  
vers. fol. 9. c.  
III.

Vide Scip.  
Claram. de u-  
nivers. fol. 9. c.  
17. 18. 19. 20.  
Zucchius phil.  
opt. par. 1. c. 17.  
sect. 6. p. 111.  
lib. 2. p. 216.



*vatas*. Thus the Objection in its full force is granted by all (except *Sorsius* deny it) only the cause of the *Phanomenon* was not till *Zucchi* (if then) sufficiently explicated; Sure I am that *he* in another place avows, that long *Telescopes* rightly made do not lessen *Jupiter*, but represent him greater then He appears to the naked Eye: insomuch that his Tube of 23 feet-long did represent *Jupiter* as big as the Moon is when at full, and looked upon without any *Telescope*: so that He says the Objection holds only in *Telescopiis brevioribus*, in quibus pariter evenit inspiciendo lucida inferiora.

*Zucchi*  
phil. opt. part.  
l. c. 17. sect. 5.  
p. 199, 200.

Besides, were there such certainty in the *Telescopes*, how comes it to pass that there is such a variety of opinions amongst those *Observers*, whose diligence can be as little suspected as their learning? *Claramontius* did set two persons to observe the Spots of the Sunne, (both were inclined to *Novelties*) they were not 40 miles distant, yet did not their *Schemes* agree as to number, or situation. Nor is this a signment of that partial *Peripatetick*: any man that reads *Ricciolus*, and *Zucchi*, will see that they cannot agree about the number, the motion, the situation, or so much as colour of them. The words of this last Writer are very remarkable in reference to Mr. *Glanvill*, and that certainty which he asserts unto the *Telescopes*, viz. *Neque obstat discrepantia numeri, vel figura macularum in observationibus plurium, circa idem tempus captatis: tum quia longiores Telescopii in ampliori disco plures exhibent, quæ spectantem breviori Telescopio, angustiori disco latent: immo eodem Telescopio, ad exactam mensuram suæ extensionis redactæ, notabiles fiunt aliquæ, ante inobservatæ: & facillimum est in tali mensura minus exercitatos decipi; cum tam pauci ex observatoribus, nec nisi monente Scheinero, didicerint ad exacte consignandam Solis imaginem, & in ea maculas, per trajectionem radiorum Telescopio in planum directe oppositum, necessariam esse mutationem extensionis Tubi, eo notabiliter magis productæ in hyeme, correpto in æstate: Tum quia sicut facilis est, ex allatis, varietas in numero macularum, ita in terminatione, quæ facilius mutari potest ex iisdem capitibus in illis, quæ in pluribus observationibus consignantur, & ex modo consignandi.* Less do they agree

*Ricciol* Almag. nov. l. 3. c. 3.

*Zucchi* phil. opt. part. l. c. 17. sect. 8 p. 233.

See this point of the variety of the spots in the Sun, particularly handled by

*Scherer* in his Notes upon *Kircherus*'s

Iter exaltationis cum celestibus.

*Scherer* l. 1. dialog. l. p. 183.

And how different the observations of

*Galileo* and *Scherer* were you may see

in a Synopsis in the *Ross*

U. l. l. c. 4. & ib. c. 10.

E

about.

about the nature of them: one Joannes Jarde named them *Astra Borbonia*: and *Malapertius*, *Maffrius*, *Rheita*, do hold them to be *Starrs*: of this opinion was *Scheinerus* once, but he afterwards assented to that of *Galilæo*, *Kepler*, *Bullialdus* and *Blancanus*, that they were not *Starrs*, but *fuliginous exhalations* arising out of the furnace of the *Solar Globe*, which he conceives to be a fire. *Kircher* and others are of the same judgement; but *Ricciolus* distrusts it, being not able to comprehend how *fuliginous vapours* should arise in such a number, so constantly, so permanently as to keep a motion about, or with the *Sunne*, of about 27 days.

Vide Scher-  
rum ubi supra  
p. 184.  
Recoll.  
Almag. nov. l.  
3. c. 3 p. 7.

Galilæo in ep.  
ad Velerum,  
citante & aca-  
demia de uni-  
vers. l. 9. c. 7.  
Ricciolus Al-  
mag. nov. l. 7.  
sect. 1. c. 2. p.  
487, 488.  
Scherinus in  
Kircher. iter  
extat. cœcæ-  
ste p. 301, 302.  
Christ. Hugen-  
ius apud Be-  
rellun de cor-  
pore p. 63.

The like uncertainty there is in the *Observations* about *Saturn*, *Jupiter*, *Mars*, &c. what controversies do they raise and how contradictory are their *Relations*? *Galilæo* doth represent *Saturn* in one figure, *Scheiner* in another: the former saith, that the oblong shape in *Saturn* riseth from a defect in the *Telescope*, or *Eye*, that could not distinguish the *Comites Saturni* from the *Planet* it self. But *Ricciolus* and others dissent from him in that point: and *Christianus Hugenius* made observations about *Saturn*, such as neither *Antonius de Rheita*, nor *Hewelius* did ever see; and represents the ansula of *Saturn*, differently from what *Fontana* and the *Dantiscan Selenographer* do write. The words of *Hugenius* I shall propose to Mr. *Glanvill's* consideration, *Expectamus ut sub finem Aprilis, si non antea, brachia Saturno renascantur, non curva illa, cujusmodi a Francisco Fontana, & Havelio depicta cernuntur, sed secundum lineam rectam utrinque prominentia, siquis melioris notæ perspicillo intueatur. Nam vulgaria si adhibeat binos orbiculos referent, sicuti Galilæo primum se obtulere. Nostram quo Saturni asseclam reperimus, quinquagies diametrum rei visa multiplicat, duodenos pedes æquans; cui postea duplum longitudine constrinximus, multiplicatione centupla. Cum autem longiora etiam hisce Telescopia, utpote triginta & quadraginta pedum ab aliis fabricari dicantur, aliquid aut vitii vitii inesse, aut hæc eadem non debita proportionem mutuo respondere credibile est. Neque enim alius hucusque aciem eorum effugisset novus Saturni Satelles.* Being to speak of *Saturn*, I must not forget *Zucchi*, who after



after thirty five years diligent observation with variety of the best Telescopes, represents this Planet differently from what any others write, viz. *Affero Saturnum multorum annorum spatio figura passim oblonga, & in oppositione ad Solem, notabiliter majorem apparuisse, in apparentia medio visum esse album illustre tumidum, aliquo modo ad rotunditatem vergens, accedentibus hinc inde ad illud duabus velut nigris notis, quas altum illustre, totam apparentiam ad apices terminans ita includit, ut ad apices illius multo sit crassius, ubi vero eas notas complectendo ad medium extenditur, gracilescat.*

Zucchius philosoph. opt. parr. l. c. 17. sect. 5. p. 201.

*Affertio est facti, in quo a multis jam, annis conveniunt accuratiores, ex variis Provinciis observatores longioribus Telescopiis instructi.*

*Scio a prioribus vulgatum, tres a se stellas in loco Saturni spectatas, media multo majori, quæ simul mutantes in cælo situm, a fixis aperte distinguerentur, & Saturni duobus Planetis minoribus stipati apparentium exhiberent, qui postea, illis a tali situ motis spectatus sit figura rotunda. Verum triginta quinque ut minimum, anni sunt, quibus figura semper oblonga, cum dispositione in assertione assignata, a me spectatus est pluries quotannis, pro vario ad Solem situ, acutioribus, minus acutis, cavis, convexisque lentibus ad oculum proxime in Telescopio adhibitis apparentia eadem, semper magis distincta, & majori, in oppositione ad Solem, etiamsi meliorem vitiorum elaborationem in multo longioribus Telescopiis postremo D. D. Evangelistæ Torricellii, & Eustachii Divini artificio, & beneficio singulari consecutus sim. — Quare in hoc priorum observationes, qui brevioribus, minusque perfectis Telescopiis, ut omnino ratas admittere non audeo.*

Concerning Jupiter, and his Satellites, and their number, taking in the Urban Octavian Starrs, I finde a great variety, even when two men observed at the same time, as de Rheita and Gassendus: that both of them were in the right, cannot be said: which of them were in the wrong, I know not. In summe, the observations about Jupiter and his Attendants are so various, *Aliter enim apparuerunt Simoni Mario, aliter Appelli, aliter Galilæo, that Claramontius takes this advantage of it. Ego igitur argumentum ex ejusmodi diversitate alio*

Vide Schottum in Kirch. iter exstinctionis cœlestis p. 268, 269 &c. Riccioli in Almag. nov. l. 7. sect. 14 p. 486.

S. ipio Cla-  
ramonit s de  
in vello 1. 5.  
c 8.

contra veritatem objecti, non contra observationum diligentiam, cum observatio ejusmodi non sit nisi pura per tubum transpectio, eaque defixa: ii etiam viri perfectum instrumentum habebant, esique id verisimile, cum in eam rem toti incumberent, instrumentum etiam exactum paravisse: oculorum etiam & visus acumen, cur de mam Apelli & ejus in observando sociis, potius Galilæo demerem, qui se fateitur oculum minus perfectum habere

Neither are they better agreed about Mars and his Figure, the umbo or spot in him. Gassendus denies that ever he saw it, though he used the Tube of Galilæo; others avow it: as you may see in Schottus and Ricciolus. In fine, as to the new *Phænomena* about Mars, Venus, and Mercury, to defend them Zucchius is forced to complain of the Telescopes, and protests thus. *Interim te, amice Lector, provoco Spectatorem, bono & longiore Telescopio instructum, cujus Lens superior ad obtinendam figuram apparentiarum bene præcisam, juxta dicta, maxima ex parte contacta sit, modico ad medium aperto foramine.*

Scottus in  
Kircher. iter  
exitar. cœli:  
p. 242, &c.  
Ricciolus Al-  
mag. nov. l. 7.  
sect. 1. p. 486.  
Zucchius  
phil. opt. part  
1. c. 17. sect. 4  
p. 193.

I am tired with the further prosecution of this subject; and therefore shall confine the rest of my discourse to the *Observations* about the Moon: the contemplation whereof, as it is more facile, so it hath been more pursued then any other of that kinde. There is none of our Comickall Wits doubt that it is a World, divided into Hills, Valleys, Seas, Lakes, Rivers, and even peopled as this Terraqueous Globe of ours. But it is remarkable, that the use of the Telescope hath not convinced some, that the Moon hath an unequal surface, but that the *Phænomena* of the spots may be solved by the conceit that some parts of it are more Diaphanous, some more opaque. Who hath not heard how Scheiner looked on the Moon in an Eclipse, and did conceive it was fistulous, (at least translucent in part) and so did transmit the light thorough several Cavities in some places, whilst others, not directly subject to the Sunne, are obscure. They cannot agree whether the Spots of the Moon be more bright, or obscure in an Eclipse. The observations and descriptions of the Moon, made by Galilæo, Scheiner, Fontana, Schottus upon Kircher,

Berigardus  
Circul. P. 6.  
de Luna. id. b



&c. are so defective, that we must repute them but as  
 the first rudiments of an intended Science. And as for the  
 descriptions of the *Phases* of the *Moon*, made by *Langrenus*  
 and *Hevelius*, however there be many things in which they  
 all agree: yet the *Telescopes* of *Ricciolus* (made by a *Bavari-*  
*an Artist*) and of *Franciscus Maria Grimaldi*, either rectified  
 the mistakes, or represented many *Phænomena* different  
 from those delineated by *Galilæo*, *Fontana*, *Torricellius*, and  
*Manzini*, viz. *Lunaris faciei partes omnes magnas, mediocres, ac*  
*minimas singillatim Telescopio intuens Grimaldus, easque sta-*  
*tim cum Langreni & Hevelii Schematibus comparans,*  
*deprehendit multa quidem egregie ab iis peracta, non*  
*pauca tamen superesse, quæ aut addenda, aut quoad si-*  
*tum, magnitudinem, figuram, symmetriam, nigroris aut*  
*claritatis differentiam corrigenda forent.* Such as re-  
 ject the exact Sphericalness of the *Moon*, introduce  
*Asperities* and *inequalities* in the surface of it, which  
 some explain by *Mountains*, *Valleys*, and *Waters*: but  
 concerning the parts of the *Moon*, which might be  
*Water*, and which *Land*, our *Observers* did differ. *Ga-*  
*lilæo* believes the spots or obscure parts to be water. *Kepler*  
 held the contrary, that the bright parts were water, and pre-  
 tends to demonstrate it out of *Opticks*. though afterwards  
 he changed his opinion for that of *Galilæo's*, which is ge-  
 nerally received. As to those *asperities* in the surface of the  
*Moon*, whether they extend to the *Limbus*, or utmost  
 circumference, or no, is a doubt amongst them: *Gali-*  
*læo* denies it; *Kepler*, *Ricciolus*, and others affirming  
 it: and the latter gives this reason why they are less  
 frequently observed there: *Vera causa cur raro asperi-*  
*tas illa Limborum videatur, est partim imperfectio Tele-*  
*scopii, &c.* Neither are they better satisfied about the  
*Atmosphæar* of the *Moon*: that there is one, *Galilæo*,  
*Kepler*, *Antonius Maria de Rheita*, *Kircher*, *Cy-*  
*satus*, *Scheiner*, with others do avow: and *Langre-*  
*nus* saith, that we may observe it with a *Telescope*: e-  
*andem Tubo specillū conspici affirmat Michael Floren-*  
*tius Langrenus.* But others deny it as peremptorily.

*Ricciolus Al-*  
*mag. nov. l. 4.*  
*c. 7.*

*Galilæo sy-*  
*stem. cosmic.*  
*p. 131. edit.*  
*London.*  
*Kepler. Astro-*  
*nom. Optic. c.*  
*6. sect. 9.*

*Ricciolus Al-*  
*mag. nov. l. 4.*  
*c. 6. q. 2.*

*Kircher. iter*  
*extlat. ccc. est.*  
*p. 48.*

*Ricciolus Al-*  
*mag. nov. l. 4.*  
*c. 6. sect. 8.*

Interim

Ricciol. Al-  
mag. nov. l. 4.  
c. 2. sect. 2.

Zucchi. phil.  
op. parr. 1.  
c. 17. sect. 9. p.  
264.

*Interim mihi (saith Ricciolus) nondum quocunque Telescopio adhibito aer hic ita patuit, ut illum potius prope ac circa Lunam, quam in aere nostro, in quo ☿ Halones fiunt, cogar agnoscere.* And Zucchi. at large proveth this Corollary, *Non eleventur vi luminis Solis vapores e Luna, sicut eleventur ex Globo e terra ☿ aqua integrato: Neque datur circa Lunam Sphæra vaporosa ulla, qualis circa dictum Globum deprehenditur.*

Having proceeded thus far, I shall take notice of some extravagant opinions that possess many of our Comical wits, and their Associates or Admirers, which are extended to the prejudice of Christianity, and the growth of Atheism in this Age, viz. That the resemblance betwixt the Moon and the Earth is such, that it is a *Terraqueous Globe* inhabited by men, and they hereupon concern themselves about their *Progeny, Salvation, &c.* I shall from hence take occasion to instruct those phantastical persons, that even *Hevelius*, who accommodated the *Terrestrial Geography* to the *Lunar Globe*, and seems to conclude that the *illuminated part is earth*, the *darker is water*: yet did it only because He knew no fitter comparison amongst sublunary bodies. — *Non est autem quod quispiam ideo existimet Lunam ex ejusmodi sabulo, luto, aut lapide esse compositam, ut hac terra nostra, siquidem fortassis ex alia poterit constare materia, ab imaginatione nostra prorsus diversa, ☿ modo adhuc incomprehensibili.* — *Minime etiam hasce Lunares aquas nostris similes assero, sed quod nihil quicquam similis, propter magnam utrarumque affinitatem hic in terra habeamus, cum quo illas comparare valeamus.* It was indiscreetly done of *Kepler, Kircher, Hevelius*, and such Writers to carry on the comparison so far, the resemblance betwixt the two Globes being so little as the most unprejudic'd persons find it to be. *Hevelius* perinde ac si *Luna* esset altera tellus, *Geographica nostratis Telluris nomina in Lunam transtulit: licet quoad figuram, situm, symmetriam, &c.* nulla fere sit *Analogia inter utriusque superficiem.* The truth whereof will further appear from those considerations which the inquisitive *Zucchi* after thirty five years use of all manner of *Telescopes* at length fixed upon, viz. *That the discrepancy of Parts in the illuminated Moon may be explained with-*

Ricciolus Al-  
mag. nov. l. 4 c.  
7 p. 203.

Zucchi. phil.  
op. parr. 2. c.  
17. sect. 9. co-  
rol. 7. p. 266.



out attributing thereunto any variety of colours: yea, it ought to be so explained. The first part of which Assertion he proves thus: because in *Opake bodies* the difference of a greater and lesser Obliquity in their scituation towards the body that shines upon them doth cause a diverse manner of *illustration*. Thus the same wall, of one uniform colour, according as it is differently illuminated, seems in some parts to be *white*, in others *pale*, in others *dark-coloured*, and *black*: besides that, a greater or lesser *asperity* or inequality of the superficies may cause an intermixture of the *enlightened* and *over-shadowed* parts, and so create different appearances of *light* and *opacity* in their most *observable* parts.

The second part He proves thus: because that the face of the Moon being looked on with a *Tube* of an *extraordinary length*, with *Glasses excellently polished* (such as *He* used for many years) appears *all of it* like a great *Tract* of *Land* covered over with *Snow*, which the *Sunne* variously illuminates accordingly as the parts are differently framed and scituated. Where there is any change of scituation in the parts illuminated in reference to the body that irradiates them, then do such parts *abate of their whiteness*: and although they still continue in such a position that his beams may in some degree and manner reach them, yet by reason of the *unequal surface* of the *Moon* (in which some parts are more elevated then others) some parts are *directly opposite* to the *Sunne*, others are glanced upon with an *oblique ray*, and this mixture of *shades* and *brightness* occasions those spots which we so talk of. Thus upon the *libration* of the body of *Jupiter*, the *girdle*, which otherwise seems *remarkably black* above the other adjacent parts of the Planet, becomes like unto the rest of the body in *whiteness*, and so *disappears*.

As to the distinction of the Moon into *Sea* and *Land*, consisting of *Mountains* and *Valleys*; although the *Analogy* may seem allowable by reason of the *Asperities* in the surface of the *Moon*, (which is a thing not to be denied: albeit that the calculation of the *height* of those more elevated parts are ridiculous, except the nature of the *Cavities* were better

Existimo materiam globi lunaris non constare terra & aqua Galileo system. cosmic. p. 132.

to

Zucchi-  
phil. opr. p. 17.  
l. c. 17. lett. 2.  
p. 260, 261.

Zucchi-  
ubi supra p.  
263.

Galileo pro-  
felleth, that in  
the Moon there  
is no rain; no  
clouds there  
thicken the  
air. Longis ac  
diligentibus  
observationi-  
bus nunquam  
id animad-  
vertere potui,  
ac semper u-  
niformem pu-  
rissimamque  
serenitatem  
ibi deprehen-  
di. Galileo.  
syll. c. 133.  
Zucchi-  
ubi supra p. 264.

to be discovered, as *Zucchi-  
us* shews) yet the imagination  
of Seas and Lakes therein, or any thing of that Na-  
ture, except what borders upon the *Peninsula delirio-  
rum* in the *Lunar Chart* of *Ricciolus*, 'tis all an improbable  
phancie. For, that the more pale and obscure spots are not  
water, appears hence, that those spots keep the same Phasis  
or appearance for many days, though the Site of the Moon,  
both in respect of the Sunne, and of us the Spectators, do  
vary much in that time: whereas when the Sunne casts his  
beams upon Seas or great waters on Earth, the Phenomena  
differ according as the Sunne, or the beholder vary their sta-  
tion: And this alone might convince us, but that I finde  
now in *Zucchi-  
us*, viz *Similiter transitum successivum radiis So-  
lis ad fundum usque ad magnis maculis intra margines illustri-  
ores contentis præbent* (ut diximus in apparentiis, pag. 239.)  
*quod non evenit in liquido profundo instar aquæ, ut in aquis ex-  
perimur etiam in multa vicinitate illustratis, quando notabilem  
habent profunditatem: tum quia constantem inæqualitatem illu-  
strationis exhibent in horizonte Lunari, & quidem, juxta dicta  
in Apparentiis (num. 3.) secundum magnam extensionem illu-  
stratam, intra reliquas partes nondum Solis radiis perfusas; imo  
aliquæ, Soli proximiores, alias sequentes in eadem majori ma-  
cula inumbrabant: hujusmodi autem convenire non possunt cor-  
pori inconsistenti, & liquido aquam referenti, quæ tamen cer-  
tum est convenire aliquibus Luna partibus, ab omnibus inter ma-  
culas computatis.* I must confess I think these reasons con-  
vincing to any persons not prepossessed; and they are  
much more enforced by him with a discourse concerning ex-  
halations and an Atmosphere about the Moon, which he de-  
nies absolutely: yet considering the proportion of the ima-  
ginary Waters to the Land in the Moon, and the heat and con-  
tinuance of the Sunne-beams thereupon, common reason  
would tell us, that the vaporous exhalations would propor-  
tionably exceed those about the Earth here, and produce  
an Atmosphere that should be observable, whereas the most  
accurate inspection at most opportune times with the best  
Telescopes could not satisfie *Zucchi-  
us*, that there was any  
such thing at all.

Kepler



Kepler (and his Master Mœstlinus) did believe that the Moon was a World consisting of Sea and Land, making up one entire Globe, as the Earth does; and that the Mountains there were much higher and bigger comparatively then those of the Earth: and adds by way of jocundry, that since the Men and other Animals commonly participate of the nature of the soyl and climate they dwell in, that the inhabitants of the Moon must be of a greater stature, and more robust constitution then those of the Earth: The Day there making up fifteen days of ours: and the Heats seem so scorching, and so unexpressible by reason of the Suns being vertical to them so long. In fine, he thinks it no absurd opinion of the Gentiles, that made the Moon a kinde of Purgatory for departed Souls.

Upon the most serious consideration of all circumstances, whereunto I could ever engage my thoughts; when I reflected upon the great difference betwixt the Days here and there; the different influence which the Sunne must have here and there through the Diversity of his Aspects, (whereupon depend Terrestrial productions) that there is no rain, no clouds there; no Atmosphere (like ours) proportioned to such respiration and life: no intermixture of earth and water: no innate diversity of colours, which occasion the Phenomena that perplex our over-curious Mortals: and that all the Enquiries hitherto made, have so little of evidence, that 'tis more clear that the

Kepler Astro-  
nomin Optic,  
c. 6. sect. 7.

Galilei System. Cosmic. p. 131. Existimo materiam Globi Lunaris non constare terra & aqua. Quæ res una ad generationes alterationesque nostris similes tollendas sufficit. Verumtamen etiam si concederetur aquam ibi terramque dari; non tamen plantæ & animalia nostris similia nascerentur, idque ob duas præcipue rationes: primo quia ad nostras generationes aspectuum Solis varietas adeo necessaria est, ut sine illis esse nulle possint. Jam autem habitudines Solis ad terram, ab illis quæ sunt ad Lunam, valde differunt. Nos quoad illuminationem diurnam, in majori parte terræ, singulis horarum viginti quatuor periodis, nostris atque diei vicissitudinem experimur, quæ in Luna menisrui demum spatii absolvitur. Item ille Solis in Zodiaco descensus & ascensus annuus, qui hiemis æstatisque vicissitudinem & dierum ac noctium inequalitatem producit, in Luna unico mense finitur: Cumque Sol apud nos sic eleveatur ac deprimatur, ut inter maximam ac minimam altitudinem intercedat differentia gradum, 47. quantæ nimirum est distantia ab uno tropico ad alterum; in Luna non nisi 10. gradibus aut paulo amplius illa differentia constet, quantæ scilicet est maxima latitudo Draconis ultra citraque Eclipticam. Nunc consideretur qualis operatio sit futura Solis in Zona torrida, si per quindecim dies continuos radiis suis eam ferire pergeret. Per se enim intelligitur, omnes plantas, herbas & animalia possum itura. Quod si vel maxime generationes ibi fierent, illæ tamen ab herbis, plantis, & animalibus nostratibus diversissime forent.

Secundo persuasissimum est mihi, nullas in Luna pluvias esse. Nam si qua parte nubes ibi congrearentur, ut sit in terra, videremus utique rerum illarum aliquid abscondi, quas ope telescopii in Luna conspicimus: & in summa, in particula aliqua nobis variaretur aspectus. Id quod longis ac diligentibus observationibus nunquam animadvertere potui, ac semper uniformem purissimamque serenitatem ibi deprehendi.

*Moon is a Cheese, (not fat, for then it would melt) oddly figured and made with Asperities in its Superficies (and perhaps a little vinnyed in some parts) then an Earth resembling ours: I could not but condemn those our Comical and Atheistical Wits, who use so little of modesty or scrupulousness in their discourses about this so uncertain subject. They are men of so little reading and inquisitiveness (whatever they pretend unto; as if this Nation produced no persons equal to them for Learning and Abilities) that they never examined these debates; but the opinions which they take up and transform into Assertions, are only the raillery or casual and imperfect pieces of conversation betwixt more intelligent persons, or some Coffee-house talk, which they confidently obtrude and impose upon speculative or more considerate Gentlemen, and render themselves insupportable in any Society.*

A young Gentleman, a friend of mine, who was not a little valued in that world, who was no stranger to the *Mathematicks*, and whose wit and learning far transcended any thing I can observe in a droll and Comediantes of these times, entertained me with a discourse once of this nature; Having spoken of the *Celestial Phenomena*, how differently they were represented by sundry men, he was more prone to suspect their *dioptrick Tubes*, then their integrity: He thought our Eyes were *Telescopes* of God Almighty's making, and the model by which the others were regulated and amended: and that any man who regarded the *daily Occurrents in vision*, could never believe it possible, that any certainty could be derived from *Telescopes*, about such *Phenomena* as we could employ only *one sense* about, and that not in a *due distance*, and with such circumstances as *legitimate* the judgement thereof: That we were to look through their *different mediums* (granting that our *Air* makes but *one Diaphanum*) and those not contrived *dioptrically*, that we know, and that since every *medium*, *thicker* or *thinner*, (besides the intercurrenties of *irregular* and *unknown* particles, like to *moats* in and upon a *Glass*) did cause a *different Refraction*, and that neither the constitution of our *Atmosphere* (as not proportionate to our *sensible enquiries*) and *air*, nor the *intermundial Ether*,

*Tubum lentibus dualibus constans dici potest omnium mere artificiosius Schol. Uti fin. l. 2. c. 7. quem vide ib. a c. 23. usque ad c. 30.*

*Tam raritas quam densitas potest esse causa refractionis. Barlema.*



nor the *Sphæra vaporosa* of the *Planets* could ever be accurately and satisfactorily searched into; no man could particularly know what he beheld, and deduce with prudence any theorems and conclusions from such infirm hypotheses. He added, that our senses and the daily objects we converse with on earth, did prejudicate rather than qualify us for these speculations: that we might easily observe what mistakes arise from the contemplation of resemblances: that similitudes, though very slender, engage the unwary, (and some that are cautious too) to conclude an identity in objects: that it would be impossible for any man without the aid of a nearer approach, and even of his other senses, to conclude whether a stick lying part in, part out of the water were straight or crooked, by reason of the refraction in the different mediums of Air and Water: and that a Glow-worm, or an Indian fire-Fly would create strange disputes and contests amongst mankind, had they no other helps to discover the Phenomenon then a Telescope, magnifying the object and its parts thirty, forty, or one hundred times. He admired that saying of Aristotle, περὶ τῶν ἐρανίων ὁμοροῦν ἐκ ὅτι τὸ φιλικός: and commended him, that in his doctrine of Meteors he pretended not to arise higher then a low degree of probability. That it was possible to imagine such things to our selves as were not really in the Moon, but not such as were there, except in a very general and indefinite manner. *Posse quidem excogitari nonnulla, quæ in Luna neque sunt, neque esse possunt: nihil autem eorum quæ ibi sunt aut esse possunt, nisi largissima generalitate.* That the appearance of an Earth, did not infer the inhabitation of men, much less Animals and Plants like ours: that our own Geography might undeceive us herein, some parts of this Globe being not peopled, and the animals, and plants, and nature of the soyle, differing so much from our European productions, as we could not have conceived, had not our Eyes and authentick testimonies gained us to a belief of it. That the most clear Eyes have in this case a kinde of a suffusion, and the most unbiassed persons their Intellectuals prejudicated, and had no reason to condemn the opinion of that Peasant, who imagi-

Arist. meteor.  
l. i. c. 4. scd. 2.  
These are the  
mets, and  
thus the judg-  
ment of Galil.  
lao Syst.  
Cosm p. 77  
"Ο περὶ τῶν  
μὲν ἐρανίων ἢ  
ἐκ τῶν γλῶσσιν  
τοῖς, καὶ π  
νόστοις ἐ  
χῆν, ἢ ἂν  
αὐτῶν τῶν λέ  
γοντων, οὗτοι τοῖς  
ἀκρίτοις διὰ  
αὐτῶν, ἵνα  
ἀληθεῖα εἴν  
ἔτε μὴ ἔχῃ  
ἔτι πρὸς ὅτι  
καὶ ἐπὶ τῶν  
κατα τὴν ἐξέτα  
σιν αὐτῶν,  
Hypocr. de  
vet. med. sc. 3.

Castles sy-  
stem cosmic.  
p. 77.

ned the *Grandeur of Rome* to be like unto his *Village*, or the *Scot* who represented *London* to be such another town as *Edinburgh*. It is an opinion wherein the *Peripateticks* and *Lyncei* are agreed: *Quicquid sub nostram cadit imaginatio-  
nem, id aut jam ante viderimus oportet, aut ex rebus rerumve  
partibus jam ante visis compositum sit, quales sunt Sphynxes,  
Sirenes, Chimera, Centauri, &c.* He smiled at those who  
thought they had much improved *solid knowledge*, by tel-  
ling men of *Quasi-terra*, *Quasi-mare*, *Quasi-sylva*, which  
he supposed to be as insignificant termes as the *Canting* of  
*Chymists*, or the *Quasi-corpus*, and *Quasi-sanguis*, in the gods  
of *Epicurus*: that it was intolerable in a *Philosopher* to  
*phrase* it thus, however a *Poet* might say,

Ἰχθῦρ, οἷός περ τε πῦρ μακάρων τε θεῶν

But nothing created in him a greater *laughter*, then the  
Proposals some made of *flying to the World in the Moon*: this  
design he thought *superlatively* ridiculous, though the con-  
trivance of *wings* for *mankind* were then but projecting at  
*Wadham-Colledge*: It did not appear to him then that *this  
World* was no *Magnet*: he wished that first these *Opiniatours*  
would go to both *Poles*, and placing themselves there try  
the Observations of *Des-Cartes* with some dust of *Iron*: that  
they would consider whether the more *remote Air* would bear  
up their *wings* and *weight*, (perhaps there might be that dif-  
ference in *Air* that there is in *water*, where those *Ships* which  
*sail in salt-water* do sink in *fresh streams*) and how it might a-  
gree with their *respiration*, since the *Air* upon the tops of  
*Andes* of *Peru* is so sharp, that those *Mountains* are as dif-  
ficult to pass, or live upon, as *Aristotle* represents *Olympus*  
to have been, where men are forced to breath through  
*Sponges*: whether that *inhability* of the *Air* for men to breath  
in it did arise from the *real nature* of so *elevated* a place, or  
that it was occasioned by some *destructive exhalations* (since  
*Mount Athos* is reputed higher then *Olympus*) he knew not:  
but he thought they might enquire well into this particular,  
and into those regions (which are different) wherein *forms,*

*thunder,*

Vide P. Alph.  
Ovagiū in  
relatione Chi-  
lensis 3.  
Ricciol Al-  
mag nov. in  
append. ad  
part. primam  
tomi primi,  
p. 730.



thunder, and snow are generated; what tempests might arise therein (of which we are not sensible here below) what provision there is against them before one arrives at the twelve Celestial houses: what accommodation of meat and drink, what money current in those parts, all which ought to be regarded lest our Experimentators should come off as ill as the Knight of the Mancha did, when he had not wherewithal to defray the expence of his Inn: besides that, he was much afraid, that at their arrival, agreeably to what Kepler saith, they might find their lodging too hot for them.

Having said these things, that great young man, (who died before that Ignorance and the Virtuosi grew prevalent) presented me with the works of Marcus Aurelius Antoninus, published by D. Meric Casaubon, opening it at that place where that understanding Emperour acknowledgeth it to have been the special favour of the Gods, that he never troubled himself about these Meteorologies and extravagant speculations, whereunto nothing humane can reach: He added, that in these kind of speculations he knew enough that was secured from superstition, that for a man to desert those Studies which qualify him for a sociable life, and were of importance to the preservation of the Government and Countrey he lived in, this was a kinde of salvagenesse, had more of the Anchorite, then of Civil Prudence, and was to be encouraged in a Cloyster, or in the deserts of Thebais, then to be made a practice among wise Statesmen.

I have sometimes entertained my self with the remembrance of this Gentleman, and guessed how he would have sported at that passage of Mr. Glanvill, in his *Scepſis Scientifica*, where he complements the R. Society, to whom that book is Addressed.

We expect greater things from Neoterick Endavors. The Cartesian Philosophy in this regard hath shewn the World the way to be happy. And methinks this Age seems resolved to bequeath Posterity somewhat to remember it. The glorious Undertakers

Concerning a  
voyage to the  
World of the  
Moon, the dif-  
ficulties of the  
passage, and of  
the air, water,  
and other cir-  
cumstances  
there, read  
Kircher his  
latter exposit.  
unto the  
Moon; and  
you will find  
how just a ca-  
veat I give  
here.

*Scepſis Scien-  
tif.* p. 133, 134.

kers, wherewith Heaven hath blest our days, will leave the *World* better provided than *they* found it. And whereas in former times *such* generous free-spirited *Worthies* were as the *Rare* newly-observed *Stars*, a single one the wonder of an *Age*: In ours *they* are like the *Lights* of the greater size, that twinkle in the *Starry Firmament*: And this last *Century* can glory in numerous *Constellations*. Should *those Heroes* go on as they have *happily* begun, they'll fill the *World* with *Wonders*. And I doubt not but *Posterity* will find many things, that are now but *Rumours*, verified into <sup>(a)</sup> *practical Realities*. It may be some *Ages* hence, a *Voyage* to the <sup>(b)</sup> *Southern* unknown *Tracts*, yea, possible the *Moon*, will not be more strange than one to <sup>(c)</sup> *America*. To them that come after us, it may be as ordinarie to buy a *payr* of *Wings* to flie into *Remotest Regions*; <sup>(d)</sup> as now a pair of *Boots* to ride a *Journey*. And to conferre at the distance of the *Indies* by *Sympathetick* conveyances, may be as usual to future times, as to us in a *literary correspondence*. The restoration of *Gray hairs* to *Juvenility*, and renewing the *exhausted marrow*, may at length be effected without a *Miracle*. And the turning the now comparative *desert World* into a *Paradise*, may not improbable be expected from late *Agriculture*.

Now those that judge by the narrowness of former *Principles* and *Successes*, will smile at these <sup>(e)</sup> *Paradoxical Expectations*: But questionless, those great *inventions*, which have in these latter *Ages* altered the face

<sup>a</sup> God forbid.

<sup>b</sup> 'Tis very cold going thither, if you believe Sir Fr. Drake; as I have shewed afore in my discourse of the North-west-passage.

<sup>c</sup> Yes a little more; the Ancients had been there before; besides, the difficulties ingoing to the *Moon* are more insuperable.

<sup>d</sup> *Pacoler's Horse*; *Fortunatus's wishing-Cap*; the skill of *Medeia* in restoring youth, all ancient and modern fables shal be really achieved!

<sup>e</sup> They that do not so laugh at you, and think such expectations thence *paradoxical*.



face of all things, in their naked *Proposals*, and meer *Suppositions*, (f) were to former times as *ridiculous*. To have talked of a *New Earth* to have been *discovered*, had been a (g) *Romance* to *Antiquity*: And to sail without sight of *Stars* or *Shoars* by the guidance of a *Mineral*, a storie more absurd then the Flight of *Dædalus*. That men should *speak* after their *tongues* were *ashes*, or communicate with each other in *differing Hemispheres*, before the invention of *Letters*, could not but have been thought a *Fiction*. *Antiquity* would not have believed the almost incredible force of our (h) *Canons*; and would as coldlie have entertained the wonders of the *Telescope*. In these we all condemn (i) *antique incredulity*, and 'tis likelie *Posterity* will have as much cause to pity *ours*. But yet notwithstanding this *streightnesse* of shallow *Observers*, there are a set of (k) enlarged Souls that are more *judiciously credulous*, and those who are acquainted with the fecunditie of (l) *Cartesian Principles*, and the diligent and ingenious Endeavours of so many true *Philosophers*, will despair of (m) *nothing*.

This is a most extraordinary *Flourish*: Yet I finde the *Rhetorick* defective in the suiting of the *Antitheses* and *Antipodoses*: but I shall not take notice of that fault now, it is so general in our *Comical Wits*. I shall now quit my *Digression*, and resume the controversie betwixt the two *Disputants*. Mr. *Glanvill*, for the credit of those *Dioptrick Glasses*, told Mr. *Cress*, "That he might try them upon *Objects* near, and easily visible, by the unassisted sight; and if he made triall, he would finde they altered the *Objects* in nothing but their proportions, which are represented larger for the advantage

f Prove that they ever did think of them: if they did not, they could not be ridiculous to them.

g Enquire into the Navigations of Antiquity, and then say this.

h The strangeness is more in the incredible force of the powder: had they known that, they would not have thought the other strange: I know not any that condemn the ancients in their credulity about such matters as were never proposed unto them, but for the credulity of this Age, expect scorn rather than pity.

k 'Tis a pretty philosophy indeed, it is all invention. l Not of the Paræcia, nor of the Philosophers stone, nor by thing in Ovids Metamorphosis, or Atlantis, or Utopia, or lus ultra, i

"*vantage of vision in things small and remote; and we have all the like reasons to distrust our Eyes, as these Glasses (for their informations are the same in all things, but the mentioned difference) and there is no man such a fool as not to make allowance for that.* — I see Mr. Glanvill is not only ignorant of the Opticks, but altogether unacquainted with Telescopes: for first there are some made by Mr. Smith-

Duobus vitis convexis instructo Telescopio, habetur simul & semel objecti medietas, vel multarum partium grandioris representatio, sed inversa: si debite addatur tertium convexum, multiplicatis adhuc refractionibus, una unius obtinetur apparentia, & in situ conformis Objecto. Zucchius phil. opt. part. 1. c. 17. sect. 2. p. 180.

wick (a very ingenious and worthy man) which represent the Phases of the Moon very well, and yet invert all Objects, but that is no default or impediment where the thing looked on is round. These convex Telescopes alter the Object in some thing else besides

their proportions: nor doth any such thing happen in a well-disposed Eye upon vision. Secondly, he might have known this further difference betwixt an un-assisted sight, and what is performed by the best and longest Telescopes about ordinary Objects, that the Dioptrick Tubes do represent the light and colours of bodies more dilute and remiss then they appear to the naked Eye. Per Telescopia, praesertim longiora, objecta spectantur luce & colore dilutiora, quam libero oculo. This is granted by Zucchius and others; and the reason is given by Zucchius, because that so great an expansion or amplification

Zucchius ubi  
supra p. 181.

Expansionem repraesentativorum aequivalere remissioni, & densationem eorum intensiori; & utramque non à medio, sed à propria conditione propagationis radiorum pendere. id ib. Si Telescopium sit extraordinariae longitudinis, ex nimia expansione, quae aequale remissioni qualitatis visibilis, apparet nimis dilutum: ut minus in eo varietas partium internosci possit. Zucchius phil. opt. p. 2. tr. 3. c. 7. sect. 5. p. 366.

Zucchius phil. opt. part. 1. c. 17. sect. 6 p. 204

of the Object, and distancing of its parts one from the other, is equivalent to a remission of those qualities therein. But to shew Mr. Glanvill a little more of his ignorance in Telescopes, I shall shew him some further differences betwixt the naked sight, and what is performed by those Glasses. For some of them represent some Objects greater then they appear to the naked eye:

Some (in the shorter Tubes) are represented no bigger, or rather less then they otherwise seem: Some Objects in the longer Telescopes are magnified indeed, but nothing so much as other Objects are by the same Glasses. The Experiments

ments



ments are obvious: place a *candle* in the dark at some considerable distance, and the flame will appear round and encompassed with rays: then take a short *Telescope* fitly made and placed, and look through it, and you will see the irradiation taken off, and the flame represented as oblong, not round, and rather seemingly less than greater than it appeared before to the naked Eye. Then turn your eye unto any coloured Object, and take notice how big it seems: assume the same *Telescope*, and you shall find that to be magnified above what it seemed to the naked eye by much. After this, take a long *Telescope*, and view the aforesaid candle through that; and at the same distance view some other coloured Object, and you shall see that this last *Telescope* will represent both Objects much magnified; but the *Candle* less of the two by far.

But I shall adde further, that it is not to be doubted but that the *Telescopes* of *Galilao*, *Scheiner*, *Rheita*, *Gassendus*, *Grimaldi*, *Eustachio Divini*, *Hévelius*, *Hugenius*, *Ricciolus*, and *Zucchi*, were good in their kind, and that they did represent

Objects as truly here on earth, as any could; yet when they come to be applied to the *Celestial Phenomena*, what difference is there in their *Observations*? How do they complain either of the default of the *Telescopes*, or want of care or skill, each in the other? *Simon Marius* boasts

of his accurateness: *Scheiner* in his *Apelles* tells us, *Observationes omnes factæ sunt summo studio cælo serenissimo, semper cum observatum est, & obscurissimo, plurimumque in absentia videlicet Luna: talis vero variis & excellentissimis, quorum uno meliorem adhuc ad stellas non vidi.* But enough may be collected to this purpose out of the foregoing discourse, so that I need not repeat it over again: out of all which as I would not be understood totally to discredit the use of *Telescopes* in celestial discoveries, (I do not

*Si Lunares discos, post tot inspectores, & inspectiones, publicatos videas, neque numero, neque conformatione sibi correspondenti: quem multæ partes vel præ aliis circumpositis illustiores interjectæ & sua multo minori illustrationis exhibitione illis interruptentes, aliquos latuerunt, & in angustioribus, vel minus accuratè expressis. Disci missi, quæ verè internoscibiles sunt in luna, & ab aliis consignantur? quantum totius Disci lunaris terminatio, & insignium in ea partium, variata?* *Zucchi* phil opt. part. 1. c. 17. sect. 8. p. 233.

Vide Scipion.  
Claymont.  
de Univers.  
l. 3. c. 8.

deny but *some things* and *some motions* are observed by them, which a *naked Eye* cannot discern; but this knowledge arrives to a slender degree of certainty, when the *Phænomena* come to be particularly explicated; and *theoremes* or *assertions* framed thence) so I would not have them too much relied on, nor men be too confident in *principles* and *Conclusions* which have no *surer Foundation* then those *probabilities*: and I do herein joyn with *Claramontius* in that *Epiphonema*, *In tanta diversitate, quid certi ex tubo Optico habemus?* If I must suspect the skill or accurateness of *Galilao*, *Scheiner*, *Gassendus*, *Hervelius*, *Fontana*, *Ricciolus*, and *Zucchi*, and such like; pardon me, if I know not whom to believe.

I have been the more large in this Point because of the insolence with which Mr. *Glanvill* persecutes that Reverend, and otherwise learned person, whom he represents to the world as He pleaseth, and accordingly treats him with that contempt and scorn which is less allowable towards a *Divine*, and such a one as is, and always hath been in that Country very much esteemed by several honourable Families, as well as others. However God hath so providentially ordered the dispute, thereby to check the pride of our *Virtuoso*, that The Man of Words cannot triumph over the Man of Axiomes. And if it be true, that our *Aristotelean* was amazed at the hard words of *Dioptrick Tubes*, &c. as if there had been *Magick* in them: I doubt not to justify Him in it; for the insolent *Virtuoso* made use of them, not as became a knowing person, but as *Conjurers* use strange termes, and of an uncouth sound, though perhaps really *Hebrew*, *Latine*, or *Arabique*.

Besides all this, perhaps Mr. *Cross* seems to have been offended at something in that mixt discourse or dispute, that might derogate from the Authority of the Scripture: many sayings are not innocent, but as they are worded or uttered. To say the Scripture was written to mens fancies is an expression very unwary in a *Divine*: although a convenient interpretation may excuse it. To say it is not written according to vulgar Methods may so be spoken, that the action may render the words culpable. And in another Age they might have



have passed better then now, when men are prone to vilifie the Scripture, especially the little Wits. I perceive Mr. Sprat is not over-tender of the dignity of the Scripture: for although there be an ancient Canon of the Church against the applying the Sacred Word of God ad scurrilia & adulatoria (which Canon is authoris'd even by the Council of Trent) yet doth he encourage men to apply it to ordinary Raillery.

The Wit that may be borrowed from the Bible is magnificent, and as all the other Treasures of knowledg it contains, inexhaustible. This may be used and allowed without any danger of prophanenesse. The Ancient Heathens did the same. They made their Divine Ceremonies, the chief subjects of their phantasies: by that means their Religions had a more awful impression, became more popular, and lasted longer in force then else they would have done, And why may not Christianity admit the same thing, if it be practis'd with Sobriety and Reverence. What irreligion can there be in applying some Scripture-expressions to Natural things? Why are not the one rather exalted and purified, then the other defiled by such Applications? — The Case is clear Gentlemen, Hath not the Lord said, What hast thou to do to take my words into thy mouth since thou hatest to be reformed? Besides, methinks our Divine might have remembred the feast of Belshazzar, and the resentment that the Lord expressed upon the applying of the consecrated vessels to the serving in a festival banquet, though to a Prince. He might have called to minde the hand-writing upon the wall, and very probably have inferred with himself, that if God was so concerned at the misapplication and abuse of those Temple-Vessels, he would much more severely interese himself where that Word of his, which he hath so many ways hallowed and recommended to our Veneration, is abused to raillery: This Humour is no part of the words or works in which the Man of God is to be perfected by reading of the Holy Scripture. I fear the great Judge will one day say unto these Drolls, Ye are weighed in the ballance, and found too light. To conclude, the generality of Raillery amounts to no more but so many idle words, and they become doubly criminal by being profane.

Plus ultra  
Page 4 4.

But this practice of theirs was the ruine of their Religion, as any man may judg who sees what use Clemens alexandrinus and Lactantius make of it against Paganism. And the Greeks thought so when they punished one, ὁτι ἐξ ὧν Χριστὸς ἦν ἡ εὐσμία.

## Of the Antiquity and Use of Chymical Physique.

Plus ultra.  
Page 102.

“**C**Hymistry hath indeed a pretence of the great Hermes for  
“its Author, (how truly I will not dispute.) From him ’tis  
“said to have come to the Egyptians, and from them to the  
“Arabians; Among these it was infinitely mingled with va-  
“nity and superstitious devices: but it doth not appear at  
“all in use with Aristotle and his Sectators: Nor doth it  
“appear that the Grecians, or the disputing Ages, were con-  
“versant in these useful and luciferous Processes. —

Our Virtuoso is not willing to dispute whether *Hermes* were the Author of Chymistry, or not: It had become one that is encharged with the Cure of Souls very well, to have declined all these other disputes, as being remote from those Studies, by which he ought to qualify himself for a besitting discharge of the Ministry. But to tell him further, what I am sure he is ignorant of, the *Egyptians* did never attribute to *Hermes* the Invention of Physick, or any part of it, but to *Apis* and *Æsculapius*; and as for that Chymistry which they practised, which consisted in melting down and

Chemix nomine olim. haud leas quid aliud significatum, quoniam χημειντικὴν, aut vero πυρρὰν ἀγγυικὴν. Illam quæ vitiorum metallorum lapidumque in melius commutationem pollicetur. Ne quidem legere est, vel medicamentis præparandis operam aliquam impendisse primos Chemix professores. Conring. de Med. Herm. c. 3. p. 15.

improving of *Metalls*, or making of *Gold*: the *Egyptians* did never reckon the discovery of that *Art* amongst the praises of their *Hermes*, though they were very forward to magnifie him, and to ascribe unto him a great many *Elogies*. Nay, when they do recount the *Authors* of their Chymistry, though they do not agree about them, yet there is none that transfers that honour upon this *Trismegistus*. But whether *Æsculapius*, or the wicked *Angels*, (to both which the Invention is attributed) were the discoverers of Chymistry, I think I may allow the *Egyptians* to have been the first Practisers of it, and that there wanted not

those



those who did mention *Hermes* amongst them that used that Art, and were esteemed *Philosophers*. Nor is the *Egyptian Chymistry* of any great Antiquity, there being no mention of it in any *Greek* or *Latine* Writer, till almost the fourth Century after *Christ*. Neither is the name only of *Chemia* or *Chemistry* of so modern a date:

Vide Conring.  
c. 3 p. 28.

but there is not any record of any book written, or work performed, that imports any such thing. Yet have the *Alchymists* (it is true) pretended to a greater Antiquity, entitling several spurious books to *Hermes*, *Moses*, (and *Miriam* his Sister) *Democritus*, *Plato*, *Aristotle*; and made as if their Art were intimated in the fable of the *Golden Fleece*, the *Hesperian Orchards*, and the *Song of Solomon*. In which I cannot but take notice of the different procedure of those *Chymists*, and our *Experimental Philosophers*: the one attributed all glorious discoveries to the *Antients*, their *Predecessors*; these will not allow them those praises which indisputably belong unto them. But however, that I may grant our *Virtuoso*, that *Chymistry* did flourish in *Egypt* in such manner and at such time, as I have declared out of *Conringius*, (to whom I refer the inquisitive Reader) yet I must not gratifie him with this other concession, that from them it came to the *Arabians*, the followers of *Aristotle* not being at all acquainted with it, nor the *Greeks*, or those disputing Ages, being at all conversant with it. For it is made evident by *Conringius*, (c. 26. p. 368.) that it passed from the *Egyptians* to the *Greeks*. There are of *Greek Writers*, *Zosimus Panopolita*, *Ompiodorus*, *Stephanus*, *Synesius*, *Michael*, *Sellus*, *Blemmydas*, and many others, which are instanced in by the same Author, and deduced through the several centuries antecedent the *Saracen Empire*. The very name of *χημεία* or *χημεία*,

In the time of *Constantine* A. D. 320. *Firmicus* is said to be the first that is recorded to have named *Alchymia*; he saith, that *Saturn* disposeth to *Alchimy*. Whence *Libavius* argues that it was then an Art, and had been long practised, or else how comes it under *Astrological Prediction*? But there is no consequence in that reason of his it being usual for *Astrologers* to accommodate the Stars so as to have an influence upon novel inventions. Under *Theodosius the Great*, A. D. 38. *Hellodorus* writ a book to the *Emperour* about the *Chymia*; and something about that art to *Crassus*, as *Cedrenus* witnesseth. *Libavius* in *Exam. censur* *Parisiens.*

Several of these *Greek Writers* were seen by *Salmasius* in the *King of France* his Library. and by *Reynsius*, (vide var. edition l. 2. c. 5 p. 155.) who transcribes this passage as the Conclusion of one of them: *Τί ποτε ὁ φησὶ καὶ τὸ μετὰ τῷ πιντῶν Ἀρὸν ἡλείων Ἀεὶ στέλναι, ἡδύνει τὴν ψυχὴν καὶ τὸν σώματος*

προς ὁ μέγας Ὀλυμπόδωρος Σπύραν-  
 ὁ εὐλόσορος, Σοφὰρ ὁ ἐν Περσίδι, Συνέ-  
 σις, εὐνὸς ἀπ' Αἰγύπτου, lest any one  
 should think that by σοφιστὴν were meant  
 our Wits, and Poets, and inventors. I  
 must adde, that it is a name long ago fix-  
 ed upon the Chymists and Chytipore-  
 ticks, as Reynesius declares.

is Greek, as Vossius observes, *de Philos.*  
*c. 9.* The Moorish particle *Al* being  
 prefixed. Nor is the word *Alembex*  
 of any other original, being compounded  
 of the said *Al* & ἀμβλιξ, a term used by  
*Dioscorides* to signify a vessel, not much

unlike our *Limbecks*. *Diosc. l. 5. c. 64.* vid. *Conring.* & *Voss.* ubi  
 supra. From the Greeks together with other Learning, even  
*Chymistry* was transmitted: and *Geber* himself (as *Leo Afer*  
 relates it, *lib. 3. pag. 136.*) was but an Apostate Grecian. This  
*Geber* is the most ancient of Arabian Alchymists, their Idol,  
 and styled *Magister Magistrorum*. I am not ignorant that  
*Conradus Gesnerus* (in *præf. ad Evon.*) and some others  
 have reckoned upon *Geber* as if he had been originally a  
*Saracen*, and the Nephew of one *Mahomet*: some say he  
 was the Grandchild of the Impostor *Mahomet*: but their  
 credit is not equal to that of *Leo Afer*, who appears a most  
 learned person, and inquisitive even to Curiosity into the  
*Lives* as well as *Customs* of the Moors, his Countreymen.

*Geberus quem  
 volunt circa  
 annum Por tus  
 virginei sex-  
 centissimum  
 in vivis fu-  
 isse Libav. ex-  
 am. censur. P -  
 risiens.*

*A'et Hist.  
 Africæ l. 3.*

*Conrad Gesn.  
 in præf. ad E-  
 vonym.*

*Habent Fessani Arabes multa Chemica artis opuscula a viris  
 doctis conscripta, inter quos potiore locum habet Geber, qui  
 centum annis post Mahometen vixit, quem natione Gidum aiunt  
 fidem abjurasse.*—*Gesner* cannot tell at what time he lived,  
 but he saith he was not the Inventor, but *Illustrator* of the Art  
 of *Distillation*.—*Quamquam non illum primum hujus Artis  
 Inventorem, sed Illustratorem fuisse existimo. Hoc in opere  
 quod summa perfectionis inscribitur, de distillatione in Ge-  
 ner Multa pulchre differens, varios distillandi modos  
 fere omnibus notos esse scribit: nimirum ut vetus quoddam suo  
 seculo, non recens quoddam inventum.*

But though the Greeks were not free of the *Metallurgical* part of *Chymistry*, yet did they not prepare any  
*Medicines* Chymically (that I know of,) except it were  
 the *Alcalisate Salts*, and *Ecchylomata*, or *Juices* formed  
 into *Extracts*, and *Oyls* drawn per descensum. This seems  
 manifest in that *Oribasius*, *Aetius*, *Paulus Aegineta*, *A-  
 lexander Trachcanus*, *PAULUS & JOANNES Fatroso-  
 phista*



phista of Alexandria, Simeon Sethus, Actuarius, Nonus, and others mention no such Medicaments: no, nor Michael Psellus, though he writ a peculiar Tract about Chemistry. Neither hath Nicolaus Myrepsus (though a modern Grecian) any Chymical Preparation.

Conringius  
c. 26. p. 370.  
Gesner. in praef.  
ad Euo-  
nym.

The Arabians seem the first that ever accommodated Chymistry in an eminent manner to Physick; if it be true, as Libavius imagines; that Abulchasis did live in the time of Muhauia the Saracen, that settled their Empire at Damascus Anno Dom. 660. Chymistry then seems to have been regulated into an Art; He writ a Book of Physick called *Servitor*, which principally treats of Medicines Chymically prepared, and useth the terms of reverberation, calcination, coagulation, distillation per ascensum & descensum: and many such like expressions, together with Processes purely Chymical. It was then that Alchymie was called *Perfectum Magisterium*; and that which we call Oyle of Bricks, did bear the name of *Oleum Sapientiae* & *Perfecti Magisterii*.

Libavius  
in exam-  
sent. Paris.

So Avicenna speaks not only of Rose-water distilled: but of Mercury and Arsenick sublimed: after him Joannes Mesues shews how to make several Chymical Oyls, as of Amber, Wheat, *Oleum Philosophorum*, &c. Neither is it to be doubted, but that there were an infinite number of Chymical Processes latent in the hands of particular Artists, since Joannes Mesues refers us unto them, viz. *de quibus loquuntur, qui quae sunt occulta in rebus manifestant & detegunt. Hos quoque aggredere rei hujus cupidus tam famosa apud illos.* After that the Western Christians were civilized and instructed in the Sciences by the Moors inhabiting Spain, and that Physick superstructed upon the principles of Galen, Avicenna, and Averroes, was derived unto them, those Sectators of the ancient Philosophy improved Chymical Pharmacy very much.

Conring. ubi  
supra. p. 374.

Vid. Conring.  
ubi supra.

Reade Liba.  
vius more su-  
ly upon this  
subject in F  
am. censur.  
Parisiens.

Nor

Conring. ubi  
supra, c. 27. p.  
379. 380, &c.

Conring. ibid.  
c. 28. p. 387.  
Erastus de  
metall. p. 34.

nor were *Albertus Magnus*, *Aponensis*, *Gentilis de Fulgineo*, *Arnoldus de villa nova*, *Raymundus Lullius*, or *Joannes de Rupe-scissa*, or *Isaacus Hollandus*, or *Basilus Valentinus*, or *Antonius Guainerius*, or *Michael Savorola*, or *Montagnana*, or *Hieronymus Schallerus*, and *Magenbuchius* (Chymical Physicians at *Norimbergh* before *Paracelsus*) or *Guilielmus Varigana*, or *Antonius Fumanellus*, or *Wolfgangus Talhenserus*, or *Hieronymus Brunsvigus* (the first that writ of Chymistry in the German tongue) any other then Pretenders to the ancient Physick and Philosophy. There was no faction betwixt the Physicians in those days; nor did they undervalue or decry each other; They rather represented themselves to be Adherents and Sectators of *Aristotle*, then his Enemies; and chose rather to sophisticate his fourth book of *Meteors*, to shew that great Man knew all things, then condemn all his other works, as if he knew nothing. Nor were they only followers of the *PERIPATETICKS*, but I finde the Chymists that did precede *Paracelsus* to be accounted *Hippocratical Physicians*: witness this passage in *Caspar Bravo*, who inquired more into them then I have had leisure to doe.

*Caspar Bravo* Resolut. Medic. part. 1. disp. 1. sect. 1.  
resol. 3. sect. 2.

With him agrees *Libavius* in the fore-cited Treatise.

Resolvendum, artem Spagiricam veterum Spagiricorum, quam *Avicenna*, *Geberus*, *Rhasis*, *Arnoldus de villa nova*, *Raymundus Lullius*, *Blemmydas*, *Braceseus*, *Virceanus*, *Joannes Augustinus*, *Panterus*, *Isaachus Monachus*, *Morienus*, *Zosymus*, & alii Hippocratis Sectatores professi sunt diversam esse a Secta Paracelsistica. With this agrees that passage of *Conringius* de Med. Herm. c. 28. Certe ante Paracelsum haud est observare in Chemicorum scriptis singularem aliquam sive Hermeticam, sive Chemicam Medicinam. Observata autem est plerumque medendi illa via quam Hippocrates, Galenus, horumque Sectatores cum Graeci tum Arabes, interq; eos *Avicenna* calcaverant: quod unum *Arnoldum Villanovanum* legenti non potest non Sole videri clarius. So *Primrose* de vulg. Error. l. 4.



c.1. *Hac medicamenta præparandi ratio non a Paracelfo inventa est: sed multis ante Paracelsum natum seculis exculta fuit ab iis etiam Medicis qui Galeni doctrinam sectabantur, ut Raym. Lullio, Villanovano, &c.*

But when Paracelsus was seized with the same spirit that seems to sway some of the *Virtuosi*: then did he begin to decry the study of *Languages*, as loss of time; our *Wits* call it *Pedantry*. He vilified *Logick* as that which caused *endless disputes*, and darkned rather than discovered *Nature*: He calls it *matrem odii, rixarum & litium*; He prohibited the reading of other good and *Ancient Authors*. He seemed to be of *no Religion*; and if for any, it was to be without *Metaphysicks*, without the mixture of *Glosses* and *Interpretations*, *Solum textum Scriptura legendum, interpretationem nullam adhibendam*. He calls upon all *Universities* and *Countries* to resort unto him, to follow him and his new discoveries, his real *Philosophy*, his *Essential Anatomies*, all other performances being but *empty and verbose*.

Because I observe som resemblance betwixt the invitations of Mr. Sprat and his, I will set one of his passages down in the Preface of his *Paragranum*, viz. *Me sequimini; Non ego vos sequar. Me, me, inquam, sequimini, Avicenna, Galen, Rhases, Montagnana, Mesue. Me sequimini; non ego vos sequar, Parisienses, Monpelienses, Suevi, Misnici, Colonienses, Viennenses, qui Danubium & Rhenum accolitis. Vos item Insula marina, Italia, Dalmatia, Athenæ, Græci, Arabes, Israelitæ, me sequimini, non ego vos sequar. Mea enim Monarchia*. Hereby any one may see that He was as conceited of himself, and as great a contemner of all ancient Learning, and of Aristotle, and Galen, &c. as some of the *Virtuosi*: and as ignorant of Latin and other tongues; and as false and imperfect in his relations; as variable in his hypotheses, as if he held nothing but with the power of revoking it, which is a great qualification of a modern *Philosopher*. He was not for the particular methods in vogue, but for a general Enquiry into the Experiments of old Women, Mountebanks, Hangmen, Husbandmen, &c. He could make use of the writings and inventions of others, concealing their names, and boasting them for new and his own,

Sed in primo de pestilente tractatu primo, ubi de Chelidonia contra imaginationes Magicas amuleto differit, adeo non rejicit Galeni & Hippocratis decreta, ut etiam amplius videri vellet Galeni ius, quam omnium scholarum profectores publici. Libavius ubi as supra.

as becomes a modest Experimentator. To evince this last assertion, I shall set down some passages of Crato, and others, to shew that the disputing Ages were not so ignorant of Chymistry as Mr. Glanvill pretends. Crato in a Letter to Erasmus writes thus; *Remedia quibus aliquando usus esse dicitur, non illius esse ex eo certus sum, quod librum vidi ante ducentos fere annos a Monacho quodam Ulma scriptum, in quo eadem medicamenta, qua ille frustillatim, nunc in has nunc in illas chartas sparsit, perspicue sunt scripta.*—And elsewhere, *Fuit in bibliotheca viri optimi & integerrimi Marci Singmoseri Sacratissimi Imp. Consilii a Secretis primi, liber ante ducentos annos a Monacho quodam exaratus. Eo multis mensibus usus sum, & omnia qua isti Paracelsici) tanquam in Eleusiniis sacris mussitant, tam evidenter tradita, ut neminem fallere possent animadverti.* He himself confesseth who were his teachers in Chymistry, and that he was far from being the first Inventour of it. *"Theophrastus Paracelsus natus anno Christi 1493. mortuus 1541. Hic non erubuit confiteri se remedia in Chymicis accepisse, & his ipsis Scientiam Artis Chymiae debere. Antiqui Philosophi (ait in 2. parte Chirurgia mag. tractat. 3. c. 1.) studiosi indagandarum longa vita causarum (recitamus breviter sententiam) destituti vero perfecta praparandorum componendorumque medicamentorum scientia ab Alchymistis eam petere non sunt veriti, atque sic utronemque laboribus conjunctis genuina praparandorum remedium Scientia exorta, & variis Chemicis experimentis in medicinam transfusus est aucta, maxime vero tincturis & floribus metallicis, quarum tincturarum quanta fuerit efficacia, antiqui ea de re Codices testantur, quos diu a Pseudomedicorum turba suppressos, nos publicos facere non dubitavimus. Remedia nostra ex Chymicorum Schola prodisse non dubito fateri: & quoniam Chymica ars infinitis erroribus scatere visa est, illud quoque Augia stabulum repurgandi laborem sumpsimus: in quo feliciter mihi versari licuit, quod ob ineunte atate magna Artis studio captus summa diligentia sub excellentissimis praeceptoribus Arti huic studuerim. Praeceptores enim fuerunt Wilhelmus Hohenheimius Pater, & alii infiniti: praeter hos quoque scriptis adjutus sum Setthagii Episcopi,*

Erasmus part.  
4. p. 300.

P. ad Ex-  
ercit. Scali-  
ger.  
Hartman &  
Crollius pub-  
lished no new  
medicines.  
Cæterum neq;  
Crollium neq;  
me aliquid  
novi protuli-  
se libenter sa-  
temur, neq; ea  
unquam utri-  
usq; nostram  
mens fuit.  
Hartman. in  
not. ad Croll.  
p. 148.  
Libavius ubi  
supra.



“*piscopi, Erhardi Laventalii, Nicolai Hipponensis Episcopi,*  
 “*Matthæi Schechtii Suffraganei Treisingensis, Abbatis Span-*  
 “*heimii, aliorumque doctissimorum Chemicarum: Quin & va-*  
 “*riis eorum experimentis factus sum locupletior, inter quos ho-*  
 “*noris causa nominandus mihi venit nobilissimus vir Sigismun-*  
 “*us Fueger Schwathensis, qui magnis sumptibus pluribus mi-*  
 “*nistris sustentatis Chemicam accessione locupletavit. Hæc ibi*  
 “*Paracelsus. Neque vero falsa scribere est putandus,*  
 “*quandoquidem seculum istum & exercitiis Chymicis &*  
 “*voluminibus scatuit, cum jam plures tractatus typis*  
 “*publicis sint impressi, nihilominus cernimus, subinde ex*  
 “*tenebris prodire plures, ita ut ne Thesauri quidem multi*  
 “*videantur sufficere cupiendis, nec Theatra.*

His followers confess, that he borrowed much out of *Basilii Valentini*, and more out of *Isaacus Hollandus*, as *Penottus* declares, *Cum incidissem in Isaaci librum de opere vegetabili, reperi de verbo ad verbum doctrinam de tribus principiis, & de separatione quatuor Elementorum ab eo desumptam. Unde constat illum præcipua sua Opera suffuratum fuisse, atque hinc inde expiscatum: ut de gradationibus medicinarum ab Arnoldo, Archidoxa a Raymundo Lullio ex sua Arte operativa: de Arcanis a Rupescissa; nihil prorsus a seipso præter convitia: & maledicta: a Trithemio varia.*---The same is confessed by *Quercetan* somewhere as I remember, and he himself intimates it by adding to many preparations the words, *Ex nostra correctione, ex mea emendatione.* Out of all which it is evident, that neither the *Grecians*, nor the *disputing Ages* were so ignorant of *Chymistry*, as *Mr. Glanvill* asserts; as it is certain that the *Arabians* as well as the *Grecians* were *disputers* and followers of *Aristotle* and *Galen*, and that particularly *Albertus Magnus* and *Roger Bacon* were *Schoolmen*. Nor can any man doubt the same of those other *Bishops* and *Monks*, who knows with what *perfect Veneration*, in those days *Aristotle* was regarded. How *useful* and how *luciferous* their *Processes* were, it is not for *Mr. Glanvill* to judge, who is ignorant of *them*: but any one will allow them, both the one and the other, *recommmendation*, who considers that their *Chymical Processes* which passed amongst *them* gave occa-

De denar. medic.  
dic.

Vide Con-  
ring. de med.  
Reim. c. 24.  
p. 252, 253.

sion to all, and make a great part of the improvements in Chymistry, in Dioptricks and other Subjects, wherein our Virtuosi pride themselves. Particularly as to Chymistry, it is as clear that the disputing Ages and followers of Aristotle were acquainted with it, and eminent for it, as that there were Monks and Schoolmen. Those men whom Mr. Glanvill so explodes, and with whom the Historian disports himself, had of late years before Paracelsus, in a manner, solely the knowledge of this Art by which Nature is unwound, &c. This Sennertus granteth. *Proximis seculis fere inter Monachos latuit Chymia, quorum non pauci illud, quo abundabant, otium post sacras meditationes & orationes, arti huic præstantissima honeste tribuerunt: inter quos fuerunt Raymundus Lullius, Albertus Magnus, Joannes de Rupe-scissa, Savanarola, Morienus, Rogerius, Trithemius, & Frater Basilius Valentinus: quorum scripta multa hoc seculo in lucem edita sunt, & multa adhuc manuscripta passim latent.* I hope there is no exception against Sennertus, how partial soever Erasmus or Crato may seem. And to affront our Virtuoso a little more, it was a follower of Aristotle, and those Disputers, a pitiful School-Divine that discovered the making of Gun-Powder, which single invention out-does all that our Collegiates boast of. In the year 1354. Bertholdus Schwarz a Benedictine Monk discovered it, and I dare warrant him in those days no enemy to the man of Stagyra, the Idol of disputers; A very ancient Manuscript gives him this Character. *Bertholdus Schwarz Goslariensis Monachus ordinis Sancti Benedicti, cum mire Chymicis delectaretur, atque eorum peritia jam magnam sibi nominis existimationem acquisisset, &c.* Any one may read the rest in Kirchers *Mundus subterraneus* l. 12. sect. 5. part. 4.

I shall relate some particular processes in Chymistry, which are mentioned by such as were not Arabians, but of a much more ancient date. In the time of Julianus and Valentinianus Emperours lived Aetius Amidenus; he and Nicolaus Myrepsus (who is indeed later then Mesue) do mention the distillation of Oyls *per descensum*, as Gesner shews; and Vossius together with Conringius avow

Nicolaus

De Conf.  
Chym. c. 3.

Vossius de  
philosoph. c.  
12. sect. 11.  
Gessn. in præf.  
ad Euseb. n.  
Vossius de  
philos. c. 13.  
Conring. de  
med. Herm. c.  
26. p. 371.



Nicolaus Myrepsus (or Prapositus) in quo illud miror nullam ab eo aquarum oleorumve Chymisticis instrumentis paratorum mentionem fieri. Capnistum tantum oleum, quod per descensum distilletur, describit, ut Aetius quoque. As to the ways of making Chymical Extracts, let any man judge whether the Grecians were ignorant of them, by these passages, as they are cited by Gunterus Billichius, viz. Chylismata extrahuntur aut exprimuntur. Extrahendi nec ars nova est, nec novus modus, quanquam Heurnio ita visum sit Method. ad praxin. lib. 1. & lib. 2. c. 25. Rationem ejus a Dioscoride accipe, verbis interpretis Ruellii lib. 3. c. de Gentiana. Contusa, inquit, radix quinque diebus aqua maceratur, postea in eadem tantisper decoquitur, dum extent radices, & ubi refrixit aqua, linteo excolatur: mox discoquitur, dum mellis crassitudo, fiat fctilique reconditur. Similia cap. 9. ejusdem libri de Centauro minore habet. Dabo tibi ipsissima Dioscoridis verba; *Χυλίζεται ὅ ἢ πύα συλλεσμένη ἐκύμων ἔσα σπέρμα*, & ἀποβρεχόμενη ἡμέρας ἑ. εἶτα ἐφέται ἄχρῃς ἂν ὑπέρῃχοι τὸ ὕδωρ. ἔπειτα τὸ τε ψυχθέν, ὑλίζεται δι' ὀθονίῃ θλαθείσης & πύας, & πάλιν ἐφέται μέχρ' μελιώδους συστάσεως. Ne quid ad plenitudinem artificii deesset, subjungit; Quod siquid concretum faucibus vasis adhærescat, deradunt, reliquoque humori permiscent. Item hac; Quæ autem siccis radicibus aut herbis liquamenta exprimuntur, decocta (ut in Gentiana mentione retulimus) præparantur. Ita Lycium & Abscynthium, hypocistis, & consimilia coguntur. De Lycio vide cap. 135. lib. 1. de hypocistide libri ejusdem cap. 128. Chylismatis denique absynthini, cap. 26. meminit. Nec aliter Extractum Melampodii clarissimus Raymundus Mindeferus concinnavit, quod in Pharmacopœia Augustana inter Ecchylismata Cathortica locum non postremum reperit. Ut hiqueat, extrahendi artificium, dignum omnino fuisse, quod & erudita antiquitas inveniret, & non degener posteritas imitaretur. Nec quicquam Chymia novi, præter liquorem attulit.

Observat &  
paradox.  
chym. l. 1. c. 2.  
p. 2.

Dioscorides  
lived in the  
days of Cleo-  
patta and  
Marc. Anton.  
whose Physi-  
cian he was, &  
so lower of  
Hierophilus,  
and conse-  
quently of  
Hippocrates  
and Aristotle.  
Vide Voss. de  
philos. c. 11.  
sect. 40. &  
Fonsium de  
script. hist. &  
phil. l. 2. c. 6.  
p. 145.

Concerning fixed and Alcalisate Salts, the Chymists and Chymical Physicians make a great noise: and undoubtedly the Invention is very extraordinary, and their use very singular in Medicine. Yet both

\* See the antiquity of the use of Alcalisate and other Salts by the Ancients, largely proved by M. Rolandus progymn. alchym. qu. 14, 15.

Vide Galen, de Theriaca sub finem, & Pharmacop. Augustan. in append. ad antidot. class. de Salib. Theriacal.

G. Bellichius observat. & paradox. chym. l. 1. c. 2. p. 30. & in Thesalo chymicum. c. 7. p. 90.

the preparation and the use of them is set down by Dioscorides, Galen, and Aetius, in their discourses about Theriacal Salts; Though latter days have reformed the preparation, as Galen

endeavoured to do that which he found in use in his time. Besides, I observe out of Gunterus Bellichius, that Aristotle was not ignorant of it. Aristoteles auctor est, Umbros cinerem harundinis & junci decoquere aqua solitos, donec exiguum superesset humoris: qui ubi refrigisset, salis copiam fecerit, lib. 2. meteor. cap. 3. Hoc se apud Theophrastum invenire Plinius testatur, lib. 31. cap. 7. Idemque non harundinei tantum juncique salis meminit, sed colurni insuper, & querni. Amborum auctoritate (nam de Theophrasto nihil mihi constat) Chymicorum castigabitur temeritas, qua suis inventis salem cineritum annumerare ausa est.

The preparation of Salt-peter with Sulphur, in order to the making of what the Chymical Physicians call Sal prunella, was known to Hippocrates, and others of the ancients, and they used it in Squinonsyes in Gargarismes for the tongue and throat. Desinant in posterum Chymici de lapide Prunella magnifice gloriari. Nam & apud Hippocratem τὸ ῥιζὸν ὀπλὸν quater invenimus. Semel quidem in tertio de morbis: bis in de internis affectionibus: denique semel in lib. de morb. mulier. Ac ne dubites erudite antiquitati cognitum cum lapidem fuisse, Plinius auctor est, nitrum frequenter liquatum cum Sulphure coqui in carbonibus, sulphuri concoctum in lapidem verti. Hec recognosce ex lib. 31. cap. 10. And the same Author saith elsewhere, Pra aliis omnibus inclaruit ῥιζὸν ὀπλὸν Hippocratis seu lapis Plinii nitrarius, dictus a barbarorum pruna seu angina, cui singulariter mederi perhibetur. Nec nova est quaecunque ea laus. Nam & Hippocrates abstergenda Saliva & muco, ac facilitanda excreationi nitrum anginosi obtulit, inditque

G. Bellichius  
observ. chym.  
l. 1. c. 5. p. 49.

G. Bellichius  
ib. l. 2. c. 5. p.  
119.



ditque collationibus Orit. *Lib. 2. de morbis, sect. 49.*

Neither is the way of *subliming Flowers of Benzoin*, any thing else then the imitation of that way which the *Ancients* had of *condensing Soot*. So *Bellichius* informs me, *Fu-* *Id ib. l. i. c. 1.*  
*ligo, deficiente Scaligero, cujusque rei pinguis crematilis pars* *p. 3.*  
*est, ac demum aliarum rerum fumus condensatus, Exerc. 56.*  
*Modus conficienda ejus, siquid artificii scabest, apud Dioscori-*  
*den extat, lib. I. c. 85, 86, 94, 97. imitatio apud Beguinum,*  
*quando Benzoinum defloravit, l. 2. c. 18.*

It may perhaps be granted by most intelligent persons, that the making of *Extracts*, and *fixed Salts*, and such instances of *Vegetables* being prepared as I have given, and the glory of those *inventions* cannot justly be denied unto those *disputing Ages*; but that the *preparation of Minerals*, and the *medicinal use* of them *inwardly*, is a discovery the *ancient times* were not acquainted with. And this is the judgment of many *learned men*. But in *refutation* of it, seeing that the *inward use* of *Antimony*, as it is several ways prepared, refers to *Basilus Valentinus*, and before his days; since that, sundry preparations of *Mercury* are more *ancient* then the humour of *Novellism*; since *Paracelsus*, *Hartman*, *Crollius* did but publish the processes of *Aristoteleans*, *Avicennists*, and such like *Monks* and *Physicians*; all that our *Virtuoso* can derive from this *Plea* is, that the *Arabians*, adherents to the old *Philosophy* and their followers, did improve the extent of *Chymistry*, and added thereunto as they did in the other practice of *Physick*, the use of *Rhubarb*, *Cassia*, *Manna*, *Tamarinds*, and other benign medicines: and this demonstrates that *Philosophy* and those notions not to be so *steril*, as they are represented in comparison of the *Fecundity* of the *Cartesian Principles*, from whence *Physick* hath received little (if any) *benefit* or advantage. But to raise this *Enquiry* beyond the times of the *Saracen Empire*, it is manifest out of *Pliny*, that *mineral-waters* were drunk in those *ancient times*: and that the *Stomach* or *rust* of *iron*, as also that drinks in which *Iron* was quenched, was given in the time of *Dioscorides* and *Galen*. That *Brimstone* was given inwardly *Diosc. l. 5. c.*  
by *Hippocrates* to *asthmatick* persons. That the *Squamma* *53.*  
*Galen. l. 1. de*  
*eris cuporist. c. 17.*

Hippocr. de  
vict. in morb.  
acut.

Vide Doring.  
de medicina,  
p. 217. Ru-  
land. pro-  
gymn. qu. 20.  
Brassavol. de  
med. purg. p.  
177. Riverius.  
Pharmacop.  
Spagir. l. 2. c.  
6.

Doring. de  
medic. &  
med. p. 19.  
Vide & Ru-  
land. pro-  
gymn. Alch.  
qu. 20.

*æris* was given inwardly, as a *purge* and *vomit* by *Hippocrates*, *Galen*, *Dioscorides* and *Celsus*: and the Experiment happily tried by *Brassavolus*, that great *Experimentator* again of later years. So the giving of *Sandaracha*, or *Orpiment* inwardly for old coughs; and the *suffiment* made out of it, are recorded by *Dioscorides*: the trochises of it recommended anew by *Mesue*, and the more modern trials in *Riverius*. Even *Chalcitis* is an ingredient in the ancient *Treacle* of *Andromachus*. I shall conclude all with the passage of *Doringius* in the place already cited, *Præter Sandarachum Isidorus, Athenæus, Idius, Eubulus, Heras, Gemellus, Agathius, Nicostriatus, Menander, Thanyros, Deletius Epagathus, Asclepiades, & alii: Alumen scissum, Auripigmentum, Æris squammam, Æs ustum, Calcem vivam, Sulphur vivum, facies unde ustat, Cadmiam, Cerussam, Gypsum, Stibium sive Antimonium in pastillos redacta dysentericis præscripserunt: quorum præparandi rationem & utendi modum vide apud Galenum lib. 9. de compos. med. sec. loc. c. 5.* Out of which passages any Reader will guets what *President later Authors* had out of the more remote *Ancients* for the giving *minerals* inwardly; and if we are just to the *Arabians* and their followers, we shall scarcely allow them any further honour, then to have found out some *new ways* to serve up *old dishes*.

I shall adde, that in *Egypt*, at such time as the repute of the *Egyptian Priests*, and their phantastical *Philosophy* had given way to the followers of *Hippocrates, Aristotle, Herophilus*, and others, that introduced the *Grecian Learning* there, that is, in, and somewhat before the days of *Dioclesian*, the *Egyptians* were *Masters* of that Secret of making *Gold*, which our inquisitive *Moderns* have so vainly sought after. Before that Age there is no mention of it, and then it is said they had such knowledge of the *Art of making Gold*, that thereby they were enriched and impowered to make War upon the *Romans*; and being overcome by the Empe-  
rour *Dioclesian*, he burned all the books which they had, containing the *Mysteries* of that *Art*, to prevent any future commotions of that *Nature*. So *Suidas* in the word

Χημεία, ἢ τὸ χρυσοῦ καὶ ἀργύρου καὶ ἄλλων μεταλλῶν τὰ βιβλία διερευνῶντα.



νησάμην. ὁ Διοκλητιανὸς, ἔκαυσε διὰ τὰ νεώτερά ἐν τῇ Ἀι-  
 γυπτίῳ. And in the word Διοκλητιανὸς he says, ὁ δὲ  
 δὴ καὶ τὰ περὶ χημείας χρυσῷ καὶ ἀρσένῳ τοῖς παλαιοῖς  
 γεγραμμένα βιβλία διερευνησάμην. ἔκαυσε πρὸς τὸ μηκέτι  
 πλεονάζειν Αἰγυπτίους ἐκ τῆς τοιαύτης προσγίνεσθαι τέχνης, μηδὲ  
 χρημάτων αὐτὲς διαρρῆντας περιεσθία τῷ λοιπῷ Ῥωμαίοις αν-  
 ταίρειν. The renown of this Story is not questioned by the  
*Chymists*, and I finde the learned *Joannes Langius* to give cre-  
 dit unto it, quoting for the truth of it in his margin, be-  
 sides *Suidas*; *Orosius* l. 7. c. 16. And *Paulus Diaconus* in the  
 life of *Diocletian*: Neither doth *Libavius* or *Rolfincius*  
 elevate the authority thereof, though he mention the pas-  
 sage of *Suidas*. And to give a further colour unto this re-  
 lation, I am informed that *Aeneas Gaxeus*, who lived in  
 the latter end of the fifth Century, when *Zeno* and *Anasta-*  
*sius* were Emperours, treating of the Resurrection, hath  
 this passage, Παρ' ἡμῶν οἱ πρὸς τὴν ὕλην σοφοὶ, ἀρσένον καὶ κατ' ἴτερον  
 παραλαβόντες, καὶ τὸ εἶδος ἀφανίσαντες ἐπὶ τὸ σεμνότερον μετα-  
 λαβόντες τὴν ὕλην, χρυσὸν κάλλιστον ἐποίησαν. But these *Nar-*  
*rations* are rejected by such as deny that other *metalls* may  
 be *transmuted into Gold*: It is replied by *Erastus*, that either  
 those *Egyptian* books contained nothing but the Art of *melt-*  
*ing down of metalls*, and separating the latent *Gold* there-  
 from: or that *Suidas* being a late writer, living but 500  
 years ago, about 800 years or more after *Diocletian*, might  
 have been imposed upon by the *Chymists* of those times (in  
 Greece, and during the *disputing Ages*! mark that *Mr. Glan-*  
*vill*) who even then might have feigned some such stories as  
 that (and the Allegorising of the *Golden Fleece*) just as they  
 have within the last Centuries counterfeited the Works of  
*Moses* and *Solomon*, and entitle them unto their *Fictions*.  
 There are an infinity of stories in *Suidas*, which render his  
 Assertions suspected: and in this he hath not the counte-  
 nance of any ancient Writer to second him. It seems strange,  
 that the *Romans* having so long ruled in *Egypt* absolutely,  
 and their Governours, they not being to be supposed free from  
 all desires of gain, how they should never apprehend the *Ar-*  
*tifice*, nor have the least mention of it in their Writers

*Joan. Langii*  
*Ep. med. l. 1.*  
*cap. 3. de O-*  
*rig. Alchym.*  
*But Oros. and*  
*Paulus Diacon-*  
*us were ere-*  
*dulous Wri-*  
*ters, and of*  
*little repute.*  
*Libavius in*  
*exam. censur.*  
*Parisens.*  
*Rolfincius*  
*chym. Art. no.*  
*redact l. 1. c.*  
*10 & Con-*  
*ring. de med.*  
*Herm. c. 3. p.*  
*21.*  
*Erastus de*  
*metallis, p.*  
*103.*

*Conring de*  
*med. Herm.*  
*c. 3 p. 23.*

(Greek or Latine) till the end of the fourth Century: and that so remarkable a passage as this should be omitted by those ancient Writers, who relate both the war and actings of Diocletian after his victory. As for that saying of *Aeneas Gazeus*, it is replied that he speaks by *hear-say*, rather than certain knowledge of the operation: that there have not wanted many learned persons, who have with a great deal of confidence, illustrated the *Resurrection* by contemplations of the *Phoenix*, and of the forms of Plants resuscitated in their several Salts, as if both were realities: yet is there no such thing as either the one or the other.

Out of all which it is evident that *Chymistry* was a practice known and in use among the Sectators of *Aristotle*: and that the Grecian and disputing Ages were not unacquainted with those Processes, though these latter times have been more various and inquisitive, and have reduced that Art into better Method, and enlarged the Practice of *Physick*, with an infinity of Medicines: and indeed we must confess our selves very much obliged by the labours of ingenious Chymists, and that they have afforded multitudes of Experiments, such as contribute to the delight of all Philosophical heads, and to the Cure of many that being sick, have either better opinion of Chymical Medicines than of others, or are pleased with their small, and commonly more pleasant dose.

But that those parts into which Chymists reduce things, are latent in the compound body, otherwise then by the *Aristotelean* distinction of *formaliter* and *materialiter* (so much laughed at by Mr. Glanvill, pag. 119.) This is an Assertion which doth not become any man that pretends to have read Mr. Boyle in his *Sceptical Chymist*, where that Point is too amply debated to be here transcribed, or ever (I think) refuted. Having denied Mr. Glanvill, that by those useful and luciferous processes, Nature is unwound and resolved into the minute Rudiments of its composition. Which Rudiments were not made use of at the first Creation, when one *Fiat* created those compound bodies, which Artful Fires sometimes (and but sometimes) analyse into several parts, as Salts, Oyle, or Sulphur and Spirit, and those grosser Elements of Earth and

Id. ib. p. 22.

De plant. re-  
fuscit. vide  
Bellich. Thef.  
tal. red. v. c. 7.  
Rolfinc. art.  
chym. l. 6. c. 3.  
& l. 7. c. 19.

See this larg-  
ly disputed by  
Libavius in  
exam. censur.  
Parisienf.

Vide Kerger.  
de fermentat.  
sect. 1. c. 3. p.  
10. & Rolfinc.  
chym. in ar.  
red. l. 1. c. 19.  
Conting. de  
med. Hermet.  
c. 22.



and water. All which are not found in many bodies, (and when they are, it is with a great discrepancy betwixt those of one Concrete, and those of another) nor any of them to be separated from Gold. Which Libavius, no, nor Dr. Willis doth not make to be the last unmixt, and simple Constituents of natural bodies, sed ejusmodi tantum substantias, in quas veluti partes ultimo sensibiles res Physica resolvuntur: Substances into which natural bodies are resolved finally as far as sense can judge, and when the Analysis is prosecuted in one sort of procedure: for another method, different Solvents, and different Fires discover different parts, and those sensible too from what the usual Chymistry builds upon. Having denied him this, I must further tell him, that when the Countrywoman sets her Eggs to be hatched, she produceth by those means such bodies as no Chymical fires with their vexatious Analysis ever would discover: so she doth when she doth brew and churms her butter. Nor is this more evident, then it is clear that the Chymical principles, when they come to be accommodated to the solving of the Phenomena in nature, or in diseases, have as much of darkness and dissatisfaction in them, as occurs in the Peripatetick way: so that now we are more dubious, not more knowing, then before: and this any man that hath considered how the Chymical Physicians disagree about the causes of diseases, and even about the common Phenomena of Nature, will easily grant me: nor will it appear less manifest, that if the Chymical hypotheses do take place, that it will subject the Mechanick Philosophy, and establish that of Anaximander, revived by the ingenious Berigardus.

De ferment.  
c. 1. p. 4.

But Mr. Glanvill adds, "That Chymistry directs Medicines less lothsome, and far more vigorous, and freeth the spirits and purer parts from the clogging and noxious appendices of grosser matter, which not only hinder and disable the operation, but leave hurtful dregs in the body behind them." — This Plea for the preferring CHYMICAL Medicines before those commonly called Galenical, is much insisted on by Beguinus, Quercetanus, and others of that way. Yet, first it is observable, that whether we regard taste or

Plum ultra,  
p. 11.

smell, those very Authors recommend as odious medicaments, and as loathsome, as ever Coerdus or Foesius in their Dispensatories, if not worse. Will any man in his Wits condemn Wormwood and Gentory because of their bitter taste, or Castoreum for the smell? Secondly, every thing is not the better for being extracted. Thus the Extract of Rhubarb, though quickned with its Salt, is not so efficacious as plain Rhubarb, except it be sophisticated with *Diagridium*. Nor is *Cinnamon* improved by Extraction. Their being more vigorous and freed from grosser parts is not always a commendation, and sometimes it carries danger with it. That those grosser parts, and those natural vehicles are requisite, seems even thence clear, that their spirits & essences must be tempered and mixed often with other gross bodies before they be given. Those appendices of grosser matter are not always noxious to Nature, since in our meats we finde none to be able to live on Chymical viands, but good Kitchen-Preparations. How many ways are there of preparing Harts-horn, yet is there not one that equals the crude Horn. I shall set down Zwelfers words, whose credit no Chymist almost will extenuate. *Licet ex cornibus vel ossibus ita Philosophice calcinatis distillationi subjectis de spiritu sale volatili, & oleo ipsorum foetido nonnihil eliciatur, non tamen propterea existimandum ipsa adhuc iisdem quibus crudum cornu pollere viribus vel majoribus etiam (prout nonnulli sibi imaginantur & asserunt) vel etiam, ut alii arbitrantur, hac calcinatione nihil aliud peractum fuisse quam quod friabilia, ad pulverandum aptiora, & magis pura reddita sunt: Neutiquam, Quippe, qui ambo cornua, tam crudum quam Philosophice calcinatum, examini ignis subjiciet, re ipsa deprehendet multum de nativa sua humiditate, de sale volatili & oleo huic cornu Philosophice calcinato detractum esse, & eorundem vix parte quarta adhuc gaudere, ut propterea & hanc calcinationem Philosophicam, licet totali exustione aliquanto meliorem, approbare nequeam: e contra vero ipsum crudum cervi cornu subtiliter & minutim raspatum pluris estimem, quod tamen diversimode parari,*

Freidag.  
Noël. med. c.  
75. p. 3. 5.  
See Mr. Boyle  
of the usefulness  
of Philos.  
part 2 p. 148,  
&c.

See this point  
fully debated  
in the Vulgar  
Errors of  
Primrose, l. 4.  
c. 3. which I  
desire Mr.  
Glanvill to  
read.  
In Pharmacop.  
August.  
De CC philosophice  
calci-  
nat. p. 805.

In prosecution of this point let any man consider, that Chymical oyle of Anniseeds is not so effectual as the powder. Heurn. meth. adv. l. 1. c. 5. Nor doth the like oyle of Camomile equal the infusion, as Simon Pauls Gl. quadrip. p. 255. practically observed. So the common Pillule de succino and Franckfort-pills transcend the minute doses of divers and the most famed Pan-

aliquanto meliorem, approbare nequeam: e contra vero ipsum crudum cervi cornu subtiliter & minutim raspatum pluris estimem, quod tamen diversimode parari,



parari, inque virtutibus suis ex-  
altari potest. Ut vel in substantia,  
forma nimirum pulveris, vel

in aqua decoctum & in mucilaginem vel gelatinam conversam  
tuto & sine nausea propinari possit. Nor is this more

true in Harts-horn than in Vipers, which are more effectual  
being eaten as Ecles, or by a common infusion in wine, or gi-  
ven in powder (plain powder) then when reduced to volatile

Salt and Essences. It is also false, that Chymical preparati-  
on always amends, or doth not render some things worse:

The ingredients of sublimated Mercury are not poison; the  
result is. How much is the nature of Antimony and Mer-  
cury altered by preparing, so that a few grains prove mortal

to the taker, who might without prejudice devour great quan-  
tities of either of them unprepared, Hydrargyrus, Antimonium

crudum larga sepius porriguntur: The infusion of crude An-  
timony, (a pound in four Gallons of Ale) often rectifies all

impurities of the blood, as well any viper-wine: and Mer-  
cury, which being crude is not only given in Pills by sundry

Physicians, but drunk without any hurt in greater or lesser  
quantities in several cases. Non desunt qui Mercurium cru-

dum in dolioli fundo detinent, ferunt vinum ne arescat, aut va-  
porem contrahat, aut pendulum fiat, ea ratione fieri. Nostale

vinum ad ventris lumbricos plurimum valere certo scimus.  
As for the hurtful dregs which the Galenical Medicaments

are said to leave behind: I am confident, that whosoever  
shall enquire into the ill consequences of the two Pharma-

ceutics, will say, that if the Galenical be not always the most  
efficacious, it is always the most safe and innocent: and any

man will be more apt to dread the violent impressions which  
the powerful spirits and minerals may make upon the mem-

branes of the Stomach (which may introduce an irrelievable  
distemper in the torrens of that part, whereupon depends the

nutriment, health, and vigour of the whole body) then any  
noxious faces or little and remediable hurt from the genera-

lity of the Galenical Medicaments. Qui Deum credit male-  
factorum vindicem ultoremque, is a noxiis medicamentis, cum

ad manum sunt alia, diligenter abstinebit: ne quando homicidii,  
accu-

chymagoga. This is an observation so common with  
all practitioners, that none but Mountebanks and  
Quacks can deny it. Cato, Steeghius, Hofman, and  
others, generally taking notice of it.

M. Ruland.  
progymn.  
Alchym. qu.  
33.

Poterius  
Pharmacop.  
Spagir. l. 1. p.  
352. This ex-  
periment is  
not down in  
the two Trea-  
tises of the Vi-  
tuosities about the  
sophistication  
of wines: but  
in short, those  
pieces (as  
much as they  
are famed be-  
fore they  
came out)  
have been  
laughed at by  
all knowing  
persons and  
Wine-ccep-  
ers.

accusante conscientia, reus fiat, parum profuerit novendecim curasse periculoso curationis genere, quo vigesimus, aut trigesimus sit necatus. *Erastus disp. de propr. medic. c. 65.* And there is this to be said in *Justification of that Course*—that those who have most decried it, and raised their repute upon a different way, yet have practised with it. In ipsius *Paracelsi scriptis passim laudantur remedia morborum vulgari modo & composita & preparata.* Etiam *Petrus Severinus teste Paludano, Medicamentis Paracelsicis non semper usus est, verum & compositionibus Galenicis saepe.* Nor are *Paracelsus & Petrus Severinus Danus* singular in this action: it is the common usage of *Quercetan, Crollius, and Hartman;* not to mention *Dr. Willis:* I shall adde, that *Chymical* medicines have never or very seldom answered their expectation, which men raise of them: and whosoever shall inquire into the credit

Conring. de med. Herm. c. 11. p. 279. Paludan. epist. ad H. Smet. Ea habetur in Bartholini cista med. in vita Severini, p. 127.

Vide Conring. de med. Herm. c. 26 p. 358 &c. de Paracelso, de Phedrone, & Pharmacis Paracelsicis vide Bernardum Dissemmiam Croneburgium in def. med. veter. c. 40, 41, &c. & de Petro Severino Dano. Vide epistolam Paludani, ubi supra, De Scheunemanno vide Rolfinc. chym. l. 1. c. 18. p. 51.

which *Paracelsus, Petrus Severinus, Phedro, or Scheunemannus, or Helmont* gained by these refined Medicaments, he shall observe that either they are infamous for their destructive courses of *Physick*, or at best atchieved nothing beyond other Mortals, except by Chance. In fine, though I have seen very good success of many *Chymical* Medicines; yet dare I not express so great an admiration for them as *Mr. Glanvill* declares: and if he in all the number of his *Philosophick* friends, had but one understanding Physician, or two, they would tell him, That there are some diseases in themselves, or by accident incurable; that men will die under the most able Physicians, and that the most best and innocent Physick

will sometimes have effects different from the wishes and hopes of the Doctor: and he would finde that by ordinary medicaments not purged from their dregs, nor exalted into spirits and essences, as great Cures are done by Countrey-Physicians and

Coun-

Nec *Paracelsi* sectatores probi, qui medicina dogmatica explosa & relicta, *Elixir vita, quintas essentias, Axungiam Solis & Lunae, &c.* & alia perniciose & deterrima pharmaca in parva dosi, magno cum supercilio exhibere solent, agrorum palato consulere volentes: cum hoc titulo tenus saltem medicamenta sint, ipsorum quidem opinione singularia, revera autem mortis fercula & pocula, quibus plerumque corpus humanum vehementer exagitur, & magna cum jactatione fatigatur, & ita debilitatur, ut aut aequè aut nunquam amplius, pristina vires recuperet. *Gabelbever. Cent. 6. hist. 7. in anthot. p. 24.*



*Countrey-Gentlewomen* oftentimes, as any ever were wrought by *Chymistry*. The *Physick* which is celebrated in the *Scripture*, that which *St. Luke*, *St. James*, *Cosmas* and *Damianus*, *Joannes Damascenus*, and others followed, was that which our *Divine* scruples, at least it leaves dregs in the body.

I confess that among the *Egyptians*, and *Arabians*, and *Paracelsians*, and some other *Moderns*, *Chymistry* was very fantastick, unintelligible and delusive; and the boasts, vanity, and canting of those *Spagyrist*s brought a scandal upon the *Art*, and exposed it to suspicion and contempt: but what the *Society* have done in order to its improvement, I understand not so well as *Mr. Glanvill* seems to do: the *Treatise* of *Dr. Willis* about *Fermentation* was writ before he was of that number: and I know not how he hath improved *Chymistry* much since. And in that famed *Piece*, all is not to be reckoned upon as *invented* (much

less is improved) that is written.

Those that have improved it most, and made it intelligible, are *Beguinus*, *Crollius*, *Quercetan*, *Hartman*, *Angelus Sala*, *Schroder*, *Zwelfer*, *Sennertus*, *Glauber*, and others, that never

conversed with the *Society*, whose *Improvements* are not mentioned by *Mr. Glanvill*, though so great, that (considering what men now write or do, is but by their *Example*, and after they had removed away all difficulties) all that our *Inventors* have done, doth not deserve to be mentioned.

I shall adde, that we owe not only the *invention*, and rude improvement of *Chymistry* to the *Disputative* followers of *Hippocrates*, *Aristotle*, *Galen*, those *superstitious* *Porers* upon the *Writings* of the *Ancients*, those ridiculous *Schoolmen*, and *Monks*, and *Physicians*, but even the present credit and esteem which it hath in the world, and upon which it hath so farre advanced it self. It was not *Paracelsus* with all his noise and Insolence, but the *Dogmatical Physicians*, who observing the benefit thereof in *Pharmacy* gave it fame, and introduced

*His notion of Fermentation, as thereby he expresseth the natural and præternatural occurrences in our bodies, is taken from Bellich. de fermentat. sect. 3. His notion of the fire in the heart is very near related to the doctrine of Conringius de calido innato; and the comparison of the blood with wine is derived from Carolus Pilo. so that those things (which are the principal in his book) seem rather illustrated excellently well, then new discoveries and Hypotheses.*

Crato medi-  
cin. ep 137.  
Erast. adv.  
Paracels.  
part. 4 p. 285.  
de metall.  
p. 8.

Semert. de  
conf. chym.  
c. 2.

roduced it into the *Shops, and Cabinets of Princes*; and the use of *serious and considerate Persons*. Crato introduced it into the *Emperours Court at Vienna*: not a *Chymical Oyle*, or *Extract* was prepared there, till he gave *Encouragement* to the thing. So did *Erastus*, a greater enemy to *Paracelsus* than to *Chymical Physick*: as appears by that saying which he uttered in the midst of his *Disputes* and animosities against the *Paracelsians*. *Equidem ne absoluta est Ars nostra sine distillatoria*. And had not *Langius, Audernacus, Gesnerus, Fernelius, Zwingerus, Schegkius, Augenius, Minadous, Matthiolus, Libavius*, and many other *Physicians* of the *Hippocratical* way introduced the *sober and honest practice* of it, and rendred it *helpful to common life*, perhaps our *Virtuosi* had never medled with it, at least not have been able to give it any esteem in the world. But now that the *Galenists and Aristoteleans*, (as they are commonly called) have refined it from its dross, and cast off the *Chrysopoietick and delusory designs*, and *magical intermixtures*, and *Rosicrucian vapours and superstitions*, all which they effected; and gave *Mr. Glanvill* the opportunity of this *Cant*, with which I conclude this discourse.

Mr. Glanvill,  
p. 12.

Perhaps not so  
delusory as  
Mr. Glanvill  
thinks: but I  
am sure the  
projects some  
go upon are  
delusory,  
have much of  
the Rosicruc-  
ian humour in  
them: and  
the design of  
introducing a  
feasible Phi-  
losophy is the  
pretence of  
Crellius, and  
of the Rosi-  
cruce Order.

"I confess, Sir, that among the Egyptians, and Arabians,  
"and Paracelsians, and some other Moderns, Chymistry was  
"very phantastick, and unintelligible, and delusive: and the  
"boasts, vanity, and cantings of those Spagyrist brought a  
"Scandal upon the Art, and exposed it to suspicion and con-  
"tempt. But its late Cultivators, and particularly the ROY-  
"ALL SOCIETY have refined it from its dross, and made it  
"honest, sober, and intelligible, an excellent Interpreter  
"to Philosophy, and help to common life. For they have laid  
"aside the Chrysopoietick, and delusory designs, and vain  
"transmutations, and Rosicrucian vapors, Magical Charms  
"and superstitious suggestions, and formed it into an instru-  
"ment to know the Depths and Efficacies of Nature. — All  
"this without dispute the Society hath done; and without dispu-  
"ting. And hereupon I do agree with our Virtuoso, that they  
"have no small advantage above the old Philosophers of the Ro-  
"tional way.

Of



## Of Anatomical Improvements.

“VV E have another advantage above the Ancients in  
 “the study, use, and vast Improvements of Ana- *Plum ultra,*  
 “tomy, which we find as needful to be known a- *p. 12.*  
 “mong us, as 'tis wonderful 'twas known so little among the  
 “Ancients, whom a fond Superstition deterr'd from dissec-  
 “tions. For the Anatomising the bodies of men was counted  
 “barbarous and inhumane in elder Times: And I observe  
 “from a learned man of our own, that the Romans held it  
 “unlawful to look on the Entrails. And Tertullian severely  
 “censures an inquisitive Physician of his time for this pra-  
 “ctice, saying, That he hated man, that he might know him.  
 “Nea, one of the Popes (Itake it 'twas Boniface 8.) threatens  
 “to excommunicate those that should do any thing of this  
 “then-abominable nature. And Democritus was fain to ex-  
 “cuse his dissection of Beasts, even to the great Hippocrates.  
 “Nor does it appear by any thing extant in the writings of Ga-  
 “len, that that other Father of Physicians ever made any  
 “Anatomy of humane bodies. Thus shy and unacquainted was  
 “Antiquity with this excellent Art, which is one of the most  
 “useful in humane life, and tends mightily to the eviscerating  
 “of Nature, and disclosure of the Springs of its Mo-  
 “tion.

I have set down without any interruption the words of  
 this English Bravo and Hector of our Modern Philosophers,  
 that my Reader might come with a greater expectation to  
 the perusal of my *Animadversions*: so high a charge of ig-  
 norance upon the Ancients, such useful discoveries of the  
 Moderns render the former to be contemptible fellows.

K

and

and the latter a very *beneficial* and *important* party in this *Age*. But if it do appear that the *Moderns* have not as yet convinced us by their *works* and *great performances* in *Physick*, that the knowledge of these *new inventions* is so necessary to *Physicians*, and so *advantageous* to *mankind*, but that those which either *sight* or *ignore* their *discoveries*, acquire a greater *repute*, are more employed and possessed of a more *honourable* and *gainful practice*, and, in fine, do *greater Cures* in general, then our *Braggadachios*; then is there no such reason for this *Triumph* of Mr. *Glanvill*, as he imagines. The better to judge hereof, I desire all considering men to look back upon the several *Physicians*, who have flourished in *Greece*, *Rome* and *Barbary*, and to view the present state of *Physick* in *Italy*, *Spain*, and *France*, and try his most severe judgement if it be possible for him to condemn that *Physick* as imperfect and pitifully deficient, which gave that credit to *Hippocrates*, *Galen*, *Rhases*, *Avicenne*, *Fernelius*, *Lacuna*, *Mercatus*, *Vallesius*, *Christophorus*, and *Thomas a Veiga*, *Glaudin*, *Massarius*, *Septalius*, *Rondeletius*, *Hollerius*, *Ballonius*, *Rodericus a Castro*, *Fonseca*, *Saxonia*, *Sennertus*, *Crato*, *Prosper Alpinus*, *Antonius Musa*, *Basavola*, *Hofman*, and many others (whom I shall not name; as indeed I name these without any order) which they now enjoy. Let him set his most ambitious thoughts on work, and see if he can propose to his desires greater things then they attained unto, and atchieved. Let him employ all his *envy*, and yet condemn their *Diagnosticks*, *Prognosticks*, or that *Secretorum Secretissimum*, their *method of curing*, and their *Medicines*. If there be little or no fault in these parts, it signifies not much what principles they went upon in *Philosophy*, nor whether they did mistake or ignore some things in *Anatomy*; as long as they were not such as hindred a *Physician* from the obtaining of that end which is designed by his *Art*: And as to the improvement of the *Therapeutick* part of *Physick*, by new *Medicaments*, or new and more pleasant preparations of old *Medicaments*, if they be no more efficacious then the former, we pay to the *Inventors* those acknowledgements, which we do to the *introducers* of new *garbs* and *fashions of clothes*, the

best



best contrivances whereof, howsoever they may excel in convenience, cannot be endeared unto us by the representations of being necessary. I have named *practical Physicians*; I shall now instance in *Chirurgery*: What man is there in this Age, that would not be content with the repute of *Ingrassias, Vesalius, Fallopius, Carcanus, Aquapendens, Spigelius, Marchettis, Severinus Paræus, Chalmetaus, Pigræus, Guillemeau, Hildanus, &c*? or what man is there in this *inquisitive Age*, that any sober man would compare with them, much less prefer before them? If the Posture of *Physick* be such, and that the value we ought to place on every thing be to be regulated by its *subserviency and conduciveness* to some end, (*finis conciliat mediis gratiam*) it is easie to judge what certain esteem we are to put upon the *modern Improvements of Knowledge* in order to *Physick*, and how far we may justly censure the *Ancients*, and such as either *sight* or are *ignorant of them*. I profess my self not to know what disease it is that the *Virtuosi* cure better, or with more certainty than those that follow those other of the *Dogmatical* way. If it were done, there would not want such as should cry such performances up; besides the interest of the *Novellists*, the sence of their great Cures, would gain them all the practice that is now in the hands of such as vary not from the *ancient Method, and Rules of that Art*. I shall adde, that I could demonstrate by *undeniable testimonies*, and such as are confirmed by *modern trials*, that the introducing of *new Medicines*, either *Chymical*, or otherwise, and the neglect of a *diffused reading*, hath occasioned the *disuse* and ignorance of several *Medicines* for *Consumptions, the Gout, Plague, and other grievous diseases*, which might be attempted with much more assurance, then is to be placed upon the *later Methods*. To prosecute this point further, I shall tell you, that *Physicians* hitherto looked with a great *indifference* upon the *Principles of natural Philosophy*, whether they were true, or no; so that they did but serve as convenient *Memorials* to regulate them in their practice, and that they did guide them to their wished end with such certainty, as if they were true. All disputes about *Natural Philosophy* that did not refer to

practice, they looked upon as *Curiosities*, going beyond their *Art*, and about which they would not contend, so as that the *Method of curing* were not undermined thereby. Upon this account they did allow of two sorts of *Truth*, the one in *Physick*, the other in *Natural Philosophy*, and that what was *such* in one, might not be *such* in the other. This *President* they derived from their great Master, *Hippocrates*, who in his discourses sometimes proceeds upon the *Doctrine of the four Elements*, as if that were *true*: Sometimes he goes upon the doctrine of *Atomes*, as if he regulated his *Cures* thereby: sometimes he seems to favour the Tenets of the *Chymists*; and he cries out as Mr. Boyle, and other *Chymists* cite him, *Non calidum, frigidum, humidum, siccum esse quod maximam vim agendi habet in corpore, verum amarum, & falsum, & dulce, & acidum, &c.* Sometimes he proceeds as it were upon the principles of the old *Methodists*, and ascribes the origin of diseases to the altering of the texture of the body, to the different conformation of parts, the different configuration of pores, &c. This was the course that *Great Man* took: he was willing to observe in all diseases the motions and the course *Nature* took; to take those for ill signs and symptoms, which he found to be such from that great *Instructor*; however ἀπαίδευτο. & ἐμαρτυροῦσα, those ways whereby *Nature* did usually terminate diseases, were the ways he thought they ought to be terminated by; and he made that the scope to be aimed at in the curing of diseases: those evacuations that had helped naturally to cure, he endeavoured to promote artificially, by such Medicines as Experience shewed to be serviceable to those ends, when administered at due times and seasons. In short, he made himself absolutely the slave of *Nature*, attended on her motions, sometimes gently leading her on, as it were a *Gentleman-Usher*; sometimes following her, as a *Page*, never pretending to command her by his Medicines: So cautious he was, that he would not adventure to do good unseasonably, and at other houres then his Teacher directed him, lest he should do harm: he would not adventure to shorten a disease, lest he should shorten his *Patient's* life. As if he had foreseen the truth of that observation, which *Vallesius*, and others in these days experiment, *Celerior quam*

See Otto Tachenius's Hippocrates redivivus and his Clavis Medic. Hippocr. De vet. medic. § 24 Concerning the meaning of which place see Eritus ad v. Patrac. p. 2. pag. 56 & Conring. de Hermet. med. c. 16 p 131.



quam pro morbi longitudine curatio, detrahens plus virium quam pro morbi ratione, facit in tempore curandos ante tempus mori.

Agreeable to this Method of Hippocrates, was that counsel which Dr. Bathurst (of Black-friers) gave me, when I first seriously set my self to study and observe his practice in *Physick*, viz. *Nunquam ille Medicus magnus erit, quisquis patitur sese principiis Philosophicis alligari atque constringi.* It is impossible for any person to be a great *Physician*, who ties up himself to one sort of *Natural Philosophy*, as if it were really true and certain: the operation of *Medicaments* is oftentimes such as answers not the *Principles* of any *Philosophy*, and the digestions of *Nature* are so different from those of *Chymistry*, her fires, her solvents, her filters, her furnaces & vessels, her mixtures and degrees of heat so discrepant, that there is no arguing from the one to the other: nor is there any thing to be relied upon in *Physick*, but an exact knowledge of medicinal *Physiology* (founded upon observation, not principles) *semeiotics*, method of curing, and tried, (not *excogitated*, not *commanding*) medicines: where this course fails (as sometimes it will) we then try uncertain *Medicines*, rather than abandon the *Patient* to those *Prognosticks*, which are seldom so fatal as to destroy all hope; and where *Skill* is at a loss, we frequently behold *Chance* to be successful. And this last is the *Mystress* of our *Reforming Physicians*, it is under her conduct that they will enrich our *Therapeutick* part of *Medicine*, and alter our *Method*. I shal not enlarge further here upon, being content to have shewed what esteem *Physicians* have had *Philosophy* in, and how they have had as little regard to the truth of their principles in *natural Philosophy*, as a man ought to have to the hand of a *Dial*, or which points out the way to any place: It is not requisite that it be a real hand, whatever men call it; nor would we endure the *impertinencies* of any that should go about to perswade us out of our way, because they that call that an *hand*, were mistaken: In sum, so the way be good and certain, I am content to be one of those whom the *Italian Proverb* commends, for going that way which the *Mules* go. *Ita quæ Muli eunt.* In this opinion I have amongst late *Writers* the learned *Hofman*, whose words are these, *Quæ enim necessitas est Medicum semper loqui cum Physico, siquidem usus, a quo pendet ars nostra, aliud velit, vel certe permittat? Quid enim ibi VERITAS est, hic UTILITAS est.*

Consultius esse nullus nescit tempore paulo longiore & tuto curari, quam paulo breviori cum certo vitæ periculo sanari. *Ernstus* disput. de propriet. med. c. 65. sub finem.

Instit. med. l. 2. c. 6. §. 11, 1. 2. c. 6. §. 11, 1. 2. c. 6. §. 11, 1. 2. c. 6. §. 11.

Nor

Jo. Ant. Van-  
der Linden  
de circuitu  
sanguin. exer-  
cit. 1. sub finem.

Nor will it be amiss to propose the Judgment of the learned Practitioner *Joannes Antonides Vander Linden*, which he passed not long before his death at *Leiden* A.D. 1659 after a mature consideration of all the new speculations in *Natural Philosophy*, which this last Age had produced and acquainted him with. "*Physici ab imaginariis incipiunt, per ratio-*  
"*cinia pergunt, & in frivola desinunt. Cordatos obtestor, an*  
"*apud se non πάν ὑπόληψις? Ad quid igitur Physica, ut nunc*  
"*constituta est, Medico? Etiam quæ nunc docetur optima*  
"*(præter quod Principiis nitatur non necessariis, & ob id*  
"*certa non sit) quid ad medendum, si scitur, utile; aut, si*  
"*nescitur, noxii confert? Etiam, si extaret, quæ absolute cer-*  
"*tis principiis & perfectis regulis constaret, tamen Medicinæ*  
"*non esset, nisi Institoria, non Institutoria. Institoria, in-*  
"*quam; nam id Medicis est Physica, quod Fabris omne ge-*  
"*nus taberna mercium Novicarum. Instituriam Medicinæ*  
"*qui volunt, ne illi sciunt, quid velit detritissimum, ubi de-*  
"*finiit Physicus, ibi incipit Medicus. Medicina non habet*  
"*opus aliena; nedum a Physicis ficta & emendicata prin-*  
"*cipia: habet sua, & certa, & ausa stare contra omnem du-*  
"*bitationis impetum. Qua fiducia concludo: Physica ho-*  
"*dierna optima Medicinæ parum aut nihil utilis est. Qui*  
"*habet aures ad audiendum audiat, mentemque sanam in*  
"*corpore sano habeat. Saltem vos, vos iterum alloquor χαριέ-*  
"*στατοι παῖδες, sapite; & ab ea quæ Medicinæ larva se tegit,*  
"*Physica cavete; & hoc agite, ut quam aliquando salutis hu-*  
"*manæ præsidem Artem in bona conscientia vultis facere, eam*  
"*ante cum certo fructu regia via velitis discere.*

Upon this account I often laugh at our modern *Virtuosi*, when they dilate themselves with a great deal of ostentation and confidence, about the qualities and correctives of *Opium*, whether it be hot or cold? which controversie how great soever, hath no influence upon practice, because both agree pretty well in the cases in which it is to be used, and many of the modern preparations and corrections are foolish, and make it worse; And as to that *Laudanum* of *Helmonts* amongst the *Virtuosi*; I have seen much more simple preparations stupifie less, and produce greater Cures, then that did when



when made by the hands of one of the *Society*, and given by another of it: whilst the best of *Modern Chymists*, *Zwelfer*; bestows this commendation upon that old medicine of *Archigenes* and *Mesues*---*Erit sic rite preparata opiata, quæ merito Laudani opiati, multarumque aliarum Opiatarum vices supplere posset.* I could enlarge here, but that Mr. *Glanvill* will think I have forgot him.

*Pharmacop.  
August in  
conf. Archi-  
genis.*

Having made this general *Apology* for *Physicians*, which is sufficient to justify them, both as to their care of their *Patients*, and their skill; I shall come to apply my discourse particularly to Mr. *Glanvill*. It is hard to reconcile the necessity of *Anatomy*, with the *Mosaical Constitutions*, it seeming strange that God should make it so unclean a thing for any one to touch a dead body, and yet the knowledge of *Skeletons* should be so necessary. To supply this, the *Jewish Rabbins* say, that God *Almighty* did reveal unto *Moses* the accurate knowledge of *Anatomy*: and when we consider how they embalmed their dead, and that embalming doth infer a knowledge of dissection, and of the *Entrails*; when we observe (out of *Buxtorfs Synagoga*) that artifice with which the *Jews* kill all *Animals*, thereby to let out the blood exactly: when we consider that the multiplicity of accidents in war, or otherwise, would render the knowledge of the inward and outward parts necessary to them, and experience acquaint them with their nature (not to mention some *Jewish* relations about the opening of the *Os pubis* and the *partus Cesareus*) I am apt to think that the ancient *Jews* were not ignorant of useful *Anatomy*, nor so superstitious as totally to avoid the practice of it; nor dare I say (with our *Virtuoso*) such Superstition is fond, which is ascribed to God as its immediate *Author*.

*Vid. Riolan.  
Anthropo-  
graph. l. 1. c. 3.*

As for the *Greeks*, the study of *Anatomy* was very ancient amongst them, since it is attributed to *Alcmaeon*, that ancient Physician (a Scholar of *Pythagoras*) as the first Author of it, if we will believe *Chalcidius* upon the *Timæus* of *Plato*. From him it was derived to posterity by tradition and manual operation, children being bred up unto it, such as were to be Physicians, as also Philosophers. So *Democritus*, *Hippocra-*  
tes,

tes, and many others came to be acquainted with it. But none of the *Ancients*, until the time of *Diocles Garysius*, did write any thing about it: which notwithstanding, that Science seems to have been in never the worse condition, as *Mercurialis* thinks. *Anatomen* *eisi a nullo veterum usque ad Dioclis etatem Scriptis mandata* *tam referat Galen. in 2. de anat. admin. melius tamen sic conservata & amplificata inde intelligere possumus, quod tunc homines a primis annis Anatomen*

*These Anatomical operations of the Youth were called ἐγχειρίσεις ἀνατομικαί, which Hofman thinks may be rendered fitly in a line, Exercitia Anatomica. Adding, Didiceram enim ex ejus operis (apud Galenum) l. 2. initio has ἐγχειρίσεις ab ipso artis incubulo fuisse puerorum, a tamitta Asclepiadea, aliorum ad faciendam medicinam. Sciebam etiam aliunde, longe aliam fuisse rationem Anatomie rationem, quam nunc est, scilicet inquam fuisse traditam historiam partium ipsarum, semperq; fultam oculari inspectione. Vide Hofman Var. L. 1. c. 12. The same is avowed by Vesalius in his Preface to Charles V.*

*Lacuna Epit.  
Galen. de anat.  
rom. admin.  
l. 2.*

*Vide Riolan.  
Anthr. p.  
graph. l. 1. c. 4.*

*I would not be understood to justify every passage in Aristotle relating to Anatomy: he hath many gross errors spread in longo: but have not also Harvey, Highmore, Silvius, and others, so many as may excuse his incogitancy sometimes?*

*Pliny l. 8. c. 18. How accurate he was (however his brevity doth not represent every circumstance, nor fully describe things)*

*ut ceteras artes,) non ex scriptis sed ex Parentum sermonibus ipsaque exercitatione addiscebant; sicque melius ipsam comparantes, non modo tenacius in animis servabant, verum etiam assiduis studiis augebant. But to put this question more out of doubt, I shall appeal to Galen, who could give a better account of what they did in the elder times than Mr. Glanvill. I have not his Works by me; but Lacuna in his Epitome thus expresseth him. "Quod veteres nihil scripserint de confectionibus administrandis, vertendum illis vitio non est: quandoquidem erat iis tum frequens tamque in communi usu ipsa Anatomie, ut domi apud Parentes etiam ab ipsa pueritia, in illa omnes olim exercerentur. Postea vero tam praclaro illo exercitio intermisso, opus certe nobis fuit Commentariis, quae Anatomicam disciplinam Chirurgicae medendi rationi maxime necessariam, integram conservarent. That Aristotle did dissect the bodies of men is manifest out of his Hist. Anim. l. 3. where he informs us how he made an inquiry into the nature and series of the veins in humane bodies: and as to his anatomizing of other creatures, beasts, birds, fishes, insects, (and how he had some thousands employed under him to that purpose) no man can doubt who reads Riolanus and*



we may judge by this that there are few of the new inventions; but are ascribed unto him; and Dr. Harvey is known commonly to have said, *Nihil fere unquam in ipsis Natura penetrabilibus invenisse se, quin cum Aristotelem suum perscrutatus evolveret idem ab illo, aut explicatum, aut saltem cognitum reperiret.* After Diocles, I find these other reckoned as notable Anatomists by Volcherus, Coiter, viz. Polybius, Erasistratus, Callistus, all Scholars of Aristotle: And after them Marinus, and Lycus, the Master of Galen, and Satyrus, and Pelops, and Numesianus, besides several others at Alexandria all which Galen went to converse with. But I must not pass by Herophilus without an especial Character, who did not only correct the mistakes in Anatomy which his Master Praxagoras fell into, but by his industry and skill acquired a reputation so great, that his name is equal to the most famous that ever were before, or since his time: This great man is preferred by Vesalius before Galen: And it was an usual saying of Fallopius, that any man might as easily contradict the Gospel, as contradict Herophilus in Anatomy. *Contradicere Herophilo in Anatomicis est contradicere Evangelio.* This man is that inquisitive Physician, of whom Mr. Glanvill speaks, and who is blamed by Tertullian not for dissecting humane bodies, but for dissecting them alive, which he terms Butchery. Because, I think Mr. Glanvill never read him, and because I will make it evident that one of the Ancients did dissect more bodies of men, then all the Society put together, and that with an extraordinary caution. I shall set down the words of Tertullian, and they are these, — Herophilus ille Medicus aut Lanius, qui sexcentos eexecuit ut naturam scrutaretur, qui hominem odiit ut nosset, nescio an omnia ejus interna liquido exploravit; ipsa morte mutante quae vixerant, & morte non simplici, sed ipsa inter artificia executionis errante. Upon which passage, Philip le prieur notes thus, *Anatomia quae & celebris magnoque in precio fuit apud Ethnicos, a veteribus Christianis odio quam maximo afficiebatur. Quamvis hic dictum Lanium Herophilum constet, quod vivos homines dissecaret. Id autem facere solitos Erasistratum, Dioclem, & Herophilum docet Claudius Galenus 8. de plac. & 2. anatom. administ.* Agreeable to

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Dr. Pearson in  
Dedic. Laer-  
tius ad Ca-  
rol. II.

Vol. Coiter in-  
tro. in anat. c. 6  
Galen in his  
Comment upon  
Hippocrates  
de nat. hum.  
reckons up a-  
bove 100 emi-  
nent Anato-  
mists of the  
ancients.  
Vide Riolan.  
Anthropogr.

Melius fon-  
dam. med. c. 1.  
p. 10. & V. ffus  
de philos. c.  
11. & c. 2.

Tert. lian. de  
anima. c. 10.  
Gagnius,  
Mercurialis,  
& Vossius read  
it 500 times  
executus.

Celsus l. i. in  
proemio.

of *Tertullian*, is that passage of *Cornelius Celsus* in his Preface. *Neccessarium ergo esse incidere corpora mortuorum, eorumq; viscera atque intestina scrutari, longeque optime fecisse Herophilam & Erasistratum, qui nocentes homines a regibus ex carcere acceptos, vivos inciderint, considerarintque etiam Spiritu remanente, ea quæ Natura clausisset, eorumque posituram, colorem, figuram, magnitudinem, ordinem, duriciem, molliciem, lavorem, contactum: processus deinde singulorum & recessus, & sive quid inseritur alteri, sive quid partem alterius in se recipit.* This *Herophilus* was undoubtedly a person of vast parts, great learning and curiosity. He brought the *Hippocratical Physick* to its height and perfection, compleating the *Anatomical part*, and illustrating the Doctrine of the *Pulses*. His followers had a School not far from *Laodicea*, as *Strabo* saith, wherein it is not to be doubted but that *Anatomy* was taught, and so in that other School of *Erasistratus* at *Smyrna*. Μεταξὺ δὲ Λαοδικείας καὶ Καρῶν ἱερὸν ἐστὶ μνηδὸς Κάρε λαλόμενον, Τιμωμενον ἀξιολύτως. Συναέστηκε δὲ καθ' ἡμᾶς διδασκαλεῖον Ἡεροφιλείων ἰατρῶν μέγα ὑπὸ Σεύξιδου, καὶ μετὰ ταῦτα Ἀλεξάνδρου τοῦ φιλαλήθους καθάπερ ἐπὶ τῶν πατέρων τῶν ἡμετέρων ἐν Σμύρνῃ τὸ τῶν Ἑρασιτραλείων ὑπὸ Ἰκασίου. From whence it is clear, that in the Reign of *Augustus Caesar* (when *Strabo* lived) *Anatomy* in the East was in great request, and that the *Physicians* and followers of *Herophilus* had a great *Academy* betwixt *Laodicea* and *Garura*. And that before those times at *Smyrna*, *Erasistratus* that was a great *Dissector* of men (even alive) had another *Academy* of his followers: whose works though they are lost, yet *Vesalius* saith, that one may conjecture out of the passages in *Galen* that relate to them, that they were very accurate *Anatomists*. — Veteribus dissectionum proceribus, quos ex Galeni libris in corporum anatome sedulo versatus esse nobis persuasum est. — Not much unlike this character of *Vesalius* is that Elogy which *Veslingius* bestows upon the Ancients in an Epistle of his to *C. Hofman*, enquiring whether the *vena lactea* of *Asellius* were a part of the *porta vena* known so long ago? Sic habeas, incertum mihi esse quid primi illi qui ante Dioclis Carystii ævum privatis affectionibus in corporis humani partes inquirebant hic viderint

Strabo Geograph. in fine  
lib 12. citante  
Mercuriali  
Var. Lect. l. 2.  
c. 12.

Vesalius de  
rad. China, p.  
158.

cun



*cum nihil eorum quæ cognorant scriptis divulgarent. Vixere fortes ante Agamemnona multi, ait Lyricus: & proculdubio ante Herophilum eximii, & in hoc dissectionum studio exercitatissimi, quos ob monumentorum defectum longa nocte oblivio premit. Vellingius Ep. 20. edit. per Bartholin.*

I shall conclude this discourse of *Herophilus*, with an observation about the time when he lived; which was not in the days of *Tertullian*, though Mr. *Glanvill* represents them as *Contemporaries*: but many Centuries before, in the time of *Ptolemaus Philadelphus*, and he is famed for his raillery upon *Diodorus Cronus*, who denied there was any motion, yet had his shoulder dislocated. See *Conring. de medic. Hermet. c. 9 p. 83*. Some make him more ancient, but none ever brought him so low as our *Virtuoso*. Vide *Voss. de Philos. c. 11. Fonsium de Script. Philos. l. 1. c. 15*.

As to the *Romans*, and their skill in *Anatomy*, I cannot say much of it, except it be to their disparagement. They were a military sort of people, rough-hewen, and thought all that below their studies or serious thoughts, which our *Experimental Philosophers* boast of, and recommend unto our care with so much vanity. All the *Mechanick*, I had almost said the *Liberal Sciences*, they thought to be excellent qualifications in their slaves, not in themselves: And they who gave *Laws* to all the world, scorned to be instructed by their vassals, and a conquered Nation. Upon this account, not onely in the time of *Tully*, but afterwards to the days of *Quintilian* and *Tacitus*, (I know not which writ the Book *De Oratoribus*) it is evident, that however many Gentlemen did inform themselves of the several parts of ingenious Learning, yet did that haughty people behold those persons with indignation, and some thoughts of hatred, in so much as that those who were best versed in it, pretended ignorance and scorn of it. Things being in this condition, and the *Romans* having no other *Physicians* then their Slaves, it is not to be wondered if they were not eminent for *Anatomy*. *Cato* had banished the *Physicians* long ago, and after-ages gave them little encouragement.

I do not at present remember any *Physician*, whose name hath any thing of the *Roman* till *Cornelius Celsus*, and after him *Veetius Valens*. *Pliny* saith, that even to his time, in the reign of *Titus Vespasian*, the *Romans* did not care to profess and practise *Physick*. *Solam hanc artium Græcorum nondum exercet Romana gravitas in tanto fructu: paucissimi Quiritum attingere, & ipsi statim ad Græcos transfuga: imo, vero autoritas aliter quam Græce eam tractantibus, etiam apud imperitos expertesque linguae, non est.* *Nat. hist. l. 29. c. 1.* In the time of *Augustus Caesar*, his freed man *Artorius Musa*, and his brother *Euphorbus* gave some credit to *Physick*, and afterwards several eminent *Greeks* are said to have flourished; but whether it were that the *Romans* were impatient to learn so much as was requisite (or thought to be so) to make a man eminent in the *Hippocratical* and *Herophilian* way; or whether they thought it more becoming their grandeur, rather to learn (with all the world) a new *Method* of *Physick*, then seem to have been so long as it were brutish and ignorant in

Ideo deserta  
est hæc disci-  
plina, quia  
necesse erat in  
ea literas sci-  
re. *Pliny.*

During the flourishing of the *Roman Empire*, the study of *Physick* was principally pursued at *Alexandria in Egypt*. There *Herophilus* and his Scholars had given it credit, and the *Empiricks* and *Methodists* had their Academies, and the *Jatrosophists* were endowed professors. The repute of *Alexandria* being such even in the days of *Valentinian*, that it was credit enough for any *Physician* to say he had been bred there. *Amimian. Marcell. lib. 22.*

comparison of the *Greeks*; or whether that the new principles and method were more agreeable to that *Empirical* way, they had been accustomed unto. (See *Plin. nat. hist. l. 26. c. 3.*) and so more easily received by the populace then that of *Hip-*

*pocrates* made up of a *Grecian* dyet, and medicaments; whatever was the reason, I finde that the *Romans* did generally incline to that Sect of *Physicians*, called the *Methodici*, begun by *Asclepiades* and *Themison* in the time of the *Triumvirate*, or *Veetius Valens*, and compleated by *Theffalus* in the time of *Nero*: This Sect seems to have had the advantage over all other the *Physicians* amongst the *Romans* from the time of *Augustus*, to the reign of *Severus*, which is near three hundred years. *Pliny* calls *Themison*, *Summum authorem*, and by that place in *Juvenal* one would guess him to have been a man of great notice and general practice in the days he



*Morborum omne genus, quorum si nomine queras,  
Promptius expediam quot amaverit Hippiæ mœchos,  
Quot Themison ægros autumnò occiderit uno.*

*Theſſalus*, againſt whom *Galen* and *Pliny* inveigh, was certainly a man, not only of great *Eloquence*, but alſo of extraordinary *Learning* and *Judgement*, as we may gueſs by thoſe parcels and fragments of that excellent man, which are all that remains of him, and they preſerved in the works of others. His Books *de Communitatibus & Syncriticis* are peeces whoſe loſſes I much lament. The Memory of his *Tombe* is not loſt upon which he inſcribed himſelf, *ιατρονικον*, or, *The Conquerour of Phyſicians*. His Letter to *Nero* had ſomething of a gallant confidence in it, which may become *Heroes*, and is juſtified in men of great *Learning*. Cum novam ſectam condiderim, & quæ ſola vera ſit, propterea quod qui ante me fuerunt omnes nihil utile prodiderunt, vel ad ſanitatem tuendam, vel ad morbos propulſandos---. The generality of his followers ſeem to have been excellent *Phyſicians*, as *Dionyſius*, *Proculus*, *Archigenes*, *Soranus*, *Attalus*, *Julianus*, and others. I ſhall not inſiſt upon a particular relation of their tenets, which one may ſee excellently illuſtrated by *Proſper Alpinus*. Proſp Alpin.  
de medic.  
methodica. This ſect of *Phyſicians* ſeems to have left impreſſions of its method and principles, in all places where the *Roman Empire* ſwayed. They placed little value upon the exact knowledge of *Anatomy*, being content with a general ſkill therein, and enquiring no further than was neceſſary. They knew that the *Romans* had formerly baniſhed the *Phyſicians* (as *Archagathus*) from amongſt them, for uſing their *Patients* with much cruelty, cutting

*Quintilian* being to deſcribe *Phyſick*, renders an account of it agreeable to the *Methodiſts*. In declaim. 8. *Gemini* *Languentes*.

They called *Gallen*, when he put himſelf forth in the world by the oſtentation of *Anatomy* and *Philophy*, *Logiater*. Logiater autem nomen ſui temporis medici Romæ *Galen*o per contemptum imponbant; ut ita eum traducerent, quaſi non rei ipſa, nec uſu, & exercitio artis peritus eſſet: Sed ad loquacitatem duntaxat & differendum de iis quæ ad artem pertinent comparatus. *Gefner*, in *Scholis* ad *Cassium* p. 57.

bodies, especially *alive*, and therefore they closed with that popular prejudice, and turned it to their advantage; neither dissecting of bodies, nor tormenting them with those odious or cruel methods of Cure, which were practised by the followers of *Herophilus*. Nor do I doubt that those objections in *Celsus* against *Anatomy*, were put into his mouth by the *Methodists*, as well as *Empirics*, viz. that all *Anatomy* of bodies was a nasty performance; but to dissect the *living*, most barbarous and cruel: that as much of *Anatomy* as would instruct one sufficiently, might be learned in a *Camp*, where the *Physician* need not make wounds, but learn at once and practice Cures. Hence it was that the study of *Anatomy* was so much out of request at *Rome* in *Galen's* time, that I think he mentions not one curious *Anatomist* there, though he tell how *Satyrus* taught him at *Pergamus*, and *Pelops* at *Smyrna*, and *Numesianus* at *Corinth*, and others. There were some that were excellent *Ostrologists* at *Alexandria*. And I am apt to think, that even he durst not for fear of publick odium, dissect any *living* men there, because, as *Celsus* saith, most people held it to be cruelty, and perhaps would not have thought well of him, who should have dissected any *dead* men. Whereupon he set up with *Apes*, dissecting them, as being

*Vesalius in his Treatise de rad. Chinae sheweth how Galen dissected Apes, and was thereby led into sundry mistakes. But even such as did blame Galen were themselves faulty, as Vesalius and Columbus; which appears by what they say about the kidneys; which they describe out of brutes, not men, as Piccolominius and Beverovicus observe Beverovic. de calculo, p. 3. Read also Fallopius Observations*

nearest to men in resemblance, and imagining the fabrick of their bodies to have as great an affinity with the parts of men, as their shapes had; that this was the cause of many mistakes in him, is certain; and demonstrated by *Vesalius*. But that he never made any *Anatomies* of humane bodies, or considered any as they came in his way, is a calumny which might be refuted by sundry instances out of his Works, and some thereof are to be seen in *Riolanus Anthopogr. l. 1. c. 12.*

*Vesalius in dedio. lib. de fabric. corp. hom. ad Carol. V. Imper. In the same place he calls Galen, dissector onis professorum facile primarius.*

*Vesalius never raised his imputations to this heighth; all that he saith of this nature, is, Nobis modo ex renata dissectionis arte, diligentique Galeni librorum praelectione, & in ple-risque locis eorundem non poenitenda restitutione constat, nun-*

*quam*



quam ipsum nuper mortuum corpus humanum rescuisse. At vero suū deceptum Simiis (licet ipsi arida, ac veluti ad offitium inspectionem parata hominum cadavera occurrerint) crebro veteres Medicos, qui hominum confectionibus se exercuant, immerito arguere. Nay, it is evident out of Galen, that the Roman Physicians which were in the Army of Antoninus did dissect the Germans that were killed by him in bat-tel. As for that Learned man of our own, out of whom he tells us, That the Romans held it unlawful to look on the Entrails: I know not who it should be. Mr. Boyle indeed doth say, that in Galens time it was thought little less then irreligious, if not barbarous, to mangle the bodies of men: which how far it is true, one may guess out of what I have said; But that Honourable Person speaks in such a manner as gives us little of exception; Mr. Glanvill is so peremptory, that I wonder that he did not deny, that the Romans did not use any Augury from the inspection of the bowels, heart, and liver of beasts; or that they did not eat the Livers of Geese, and other Guts of several Animals. This is so well known to every School-boy that hath read Martial, or Horace, or Virgil, that I need not speak of it. Had the Romans held it so unlawful a thing to behold the Entrails of Animals, I wonder they gave the name of Visceratio to those distributions of flesh which they publicly used: to such unlawful customs, Virgil would not have alluded, when he brings in Dido her self,

Galen. l. 3. sec.  
gen. c. 2.

— Pecudumque reclusis

Pectoribus inhians spirantia consulit exta. Æneid. l. 4. v. 64. & Georgic. l. i. v. 484.

Tristibus aut Extis fibra apparere minaces.

Nay, they carried the bodies of beasts open with their Entrails displayed to be sold publicly, as Mart. shews l. 6. ep. 64.

Ne valeam, si non multo sapit altius istud,

Quod cum panticibus laxis, & cum pede grandi

Et rubro palmone vetus, nassique timendum,

Omnia crudelis Lanius, per compita portat.

But perhaps he will confine his discourse to the Entrails of men, why then did not he speak more plainly? And even in this case, that some superstitious persons might hold it impious and unlawful is possible:

and

I believe that  
place in Pliny  
relates onely  
to Augury,  
that it was  
not lawful a-  
mongst men to  
make use of  
humane bo-  
dies, and  
search their  
bowels to  
these ends:  
this was ne-  
fas: but no-  
thing else.

and that others out of enmity to the *Anatomical Physicians*, (as Pliny l. 28. c. 1.) *Aspici humana extra nefas habetur*, might call it so, I deny not. But what Law was there against it? How comes it to pass, that *Gelsus* in his debate about the lawfulness of *Anatomizing* even *living bodies*, saith (or maketh others to say) that it is only *cruel*, or *nasty* and *abominable*; not *impiety* or a *breach of Religion*? Besides, how could any *Physician* in those days have dressed such wounds in which their *Entrails* either gushed out, or were hurt, in case it had been *unlawful to look upon them*? It is manifest that *Gelsus* saith, a prudent *Physician* may from such accidents learn *Anatomy*; *Ita sedem, positum, ordinem, & figuram, similiaque alia cognoscere prudentem medicum*, and adviseth him to improve the occasion: And he was a Person learned not only in the *Physick*, but *Civil Laws* of his *Country*.

To convince our *Virtuoso* a little more, out of *School-books*, in which he ought to be conversant. Is there not a controversie agitated in *Seneca*, *Controvers. l. x. contr. 6.* about *Parrhasius* the *Painter*? how he brought an old *Olynthian*, and dissected him *alive*, thereby to draw the picture of *Prometheus* with a *vulture* preying upon his *Liver*? Is it not agitated *pro* and *Con*, by *Romans* and *Grecians*? Is there any one that saith it was *unlawful* for him to behold the *Entrails*? Nay, is it not said in the midst of *Rome*, that it was always *LAWFUL*? In *argumentis dixit, quantum semper Artibus LICUISSET, Medicos ut vim ignoratam morbi cognoscerent, viscera rescidisse HODIE cadaverum artus rescindi, ut nervorum articulorumque positio cognosci possit.* In *Quintilian* is there not a *Declamation Declam. 8. (Gemini languentes)* in which the *Mother* accuseth the *Father* for permitting the *Physician* to dissect one of the sick *twins*, thereby to discover the disease of the *other*? Doth not the *Mother* there bid him dissect the bowels of the *dead youth*? *Differ saltem, pater, hanc calamitatem: quicquid ex filio facis, facies ex cadavere. Si deprehendi potest languor dum occidit, facilius cum occiderit.* Doth she not describe the cruelty of that *Anatomy* very tragically? *Passus est miser discurrentem per omnia reaserati pectoris improbum vage artis errorem.*



rem. Contentum fuisse medicum toto homine discurrentem primo putatis aspectu? Egesta saepe vitalia, pertractata, diducta sunt: fecerunt manus plura, quam ferrum. Stat juxta medicum pater apertis visceribus inhians, stillantem animam sedem cruentis manibus agitantem: ne festinet, hortatur; jubet altius diligentiusque scrutari: Interrogat, dubitat, contendit, affirmat, & accepit de filii morte rationem — Inter hac reficiebatur miser haustibus, detinebatur alloquiis, comprimebatur residuus cruor, claudebantur aperta vitalia. Nemo unquam tam nova pertulit commenta sevitiae, tanquam sanaretur occisus est. Vos tunc putatis illius tantum languoris medicum quaesivisse causas? quaesivit quicquid nesciebat, & usus occasione rarissima in omnem voluit proficere novitatem. After this she tells in what manner she gathered up his bowels, and by closing up his Corps fitted him for the Funeral. Corpus quod medicus, quod reliquerat pater, hoc sinu misera collegi, ac vacuum pectus frigidis abjectisque visceribus rursus implevi, sparsos artus amplexibus junxi, membra diducta composui. If any one can imagine, that this great Oratour in so solemn a Declamation would have omitted so important an objection as the unlawfulness and impiety of beholding the entrails of the youth, certainly he thinks too meanly of the judgment of Quintilian, and too well of his own. It appears out of that Oration, that they had seldom opportunities of dissecting men alive, and therefore he calls it rarissimam occasionem. And that they were not ignorant of Anatomy and the inward fabrick of humane bodies, it is evident further out of that Oration, where the Mother says the Physicians must needs already have learned that part of their Art.

Sufficit quod aliquando jam facta ex unius hominis inspectione, ad totius intellectum natura medicina profecit. Quid allaturus huic agroto es, quod non tot seculorum, tot languentium experimenta detrehenderint?

As for what Mr. Glanvill saith about Democritus, that he was fain to excuse himself to Hippocrates for dissecting of beasts; this is as true as all the rest. Never was there a fitter second

How could they behold the Ludi Circenses, the Gladiators fighting in the Theatre, and at the tombs of the deceased; or those sad spectacles described by Martial? I profess I think it as gross a mistake to say they held it unlawful to behold the entrails of men, as to deny the Augury by beasts.

for Mr. Sprat, then Mr. Glanvill. They do not cite, but invent stories, and that with so much confidence, that a man must be assured by his own reading, before he can suspect theirs. That Hippocrates was a diligent Anatomist, is a thing every one must confess who either knows the manner of their education then, or hath looked into his Anatomical books *de locis in homine, de fracturis*, and sundry other pieces of his. That he not only contemplated the seat and action of parts in the dead, but living, appears by this passage, *De Articulis* sect 43. where he speaks about the setting of the Sphondyles of the back; *Itaque si tale contingat, palam est quod neque concutiendo, neque alio quodam modo reponi possit, nisi qui dissecto homine & manu in ventrem injecta, inquisitionem faciat, ut ex interna parte ad externam manu retrudat: atque hac in mortuo quidem facere possent, in vivo autem non ita.* But I shall give an account of the Anatomy of Hippocrates, in the words of the learned Riolanus Anthropograph. l. 1. c. 2. *Testatur Galenus Comment. in lib. 3. de artic. Hippocratem potissimum rationi corporum incidendorum sedulam operam dedisse, cum Anatomicen mirum in modum ad artem medicam conferre sciret, quod nunc aperte docet cum spina naturam intelligi voluit, quam Empirici non secus atque ceterarum partium contemplationem inutilem esse dicunt. Ipsemet Hippocrates lib. 3. de artic. Commentarios de venis & arteriis pollicetur, quos nunquam videre potuit Galenus. Præterea librum de dissectione conscripsit, quem imperfectum habemus. Ipsemet Galenus libros de Anatome, secundum Hippocratis doctrinam composuerat, quorum deploranda est jactura. Hippocrates canes dissecti ut pulmones observaret. lib. de corde. Ibi dem monet quod dissectio accurata hujus partis non est opus cuiusvis, sed periti artificis, & appellat istud opus Chirurgical. l. 6. Epidem. scribit hominem habere cola intestina cani similia. Idem lib. de intern. affect. testatur se in bove, in cane, & sue, quod impedibus dissectis tubercula in pulmone aqua referta invenisse, unde natus fuerat hydrops thoracis. Idem testatur se ex hominis ossibus ossa descripsisse: primus spinæ admirabilem figuram descripsit: primus vesiculas seminarias, earumque situm, omenti usum, valvulas venarum, ortum nervorum, lienis actionem,*

Pag. 800. rem.  
2. edit. Vander Linden.



actionem, uteri conformationem. Atque ut extaret aliquod monumentum æternum & immutabile sue diligentia, laborisque in hoc studio exantlati, sceletum are fabricatum Apollini Delphico consecravit: ut Author est Pausanias lib. 10. And is it credible that ever Democritus should be forced to excuse himself to Hippocrates for cutting up of Animals, as if it were so uncouth and strange to him? I cannot answer for the Intellectuals of our Virtuoso, but no man of an higher capacity can believe it. The pleasantest part of this Narrative is, that there appears no such thing upon record. First of all the story of Democritus, how Hippocrates came and found him busie in dissecting of Animals, is called in question by Cortesius in Miscellaneis, as Riolanus tells me. And indeed I cannot perswade my self that those Letters in the end of Hippocrates works are genuine. But to pass by this exception. All that Hippocrates writes in his second Letter to Damagetus amounts to this. That at the request of the people of Abdera, he came to cure Democritus of his supposed madness, that being conducted to his house, he found him sitting under a Plantanus tree in a garb not much differing from a madman, and postures that had something of the same humor: Ipse Democritus sub ampla & humillima plantano sedebat, in veste crassa citra humeros desinente, solus, discalceatus, super lapidea sede, valde pallidus ac macilentus, promissa barba — Ipse vero cum inculto ornatu, super genibus, librum habebat, sed & alii quidam ex utraque parte adjacebant. Accumulata etiam erant Animalia multa per totum resecta. Et ipse quidem aliquando concitate incumbens scribebat, aliquando quiescebat, diu multumque se continens, & in seipso maditans. Deinde non longe post, his peractis, exurgens deambulabat, & viscera animalium inspiciebat, & depositis ipsis digressus, rursus desidebat. — When Hippocrates approached near him, he was busie writing, and even then his deportment had something odde and Enthusiastical in it. Τὰ μὲν ἐμαρτία, τὰ δὲ ἐξεγέλα — ὅτι δὴ πῶτε γράφων ἐνθουσιῶδως, καὶ μεθ' ὀρμῆς. After the first complements (which are great and not usual in those days) Hippocrates demanded of him what he was writing? He replied about madness: καὶ τί μὲν

about that, said the great Physician? To which he answers again thus. Τί γ' ἔπεν, ἄλλο πλὴν ἑῷς τὸ ἐν, ὅκας ἀνθρώποις ἐγ-  
γίνεται, καὶ τίνα τρόπον ἀπολοφείλο. Τάτε γ' ζῶα ταῦτα, ὅκ' ὅσα,  
ἐφ' ἡρώ, τέτε μὲντοι γε ἀνάλεμνω ἐν ἐκείνῳ μισθῶν Θεῶν ἔργα, καὶ ὅλῃς  
Ἰδίζηται. Ὁ φύσιν καὶ θέσιν. *Quid enim, inquit, aliud quam quid  
sit, & quomodo in hominibus generetur, & quomodo allevetur.*  
*Nam animalia hæc, quæ vides, inquit, hujus gratia refeco, non  
quod odio habeam opera Dei, sed bilis naturam ac sedem qua-  
rens.* How much this and the whole passage of that En-  
terview makes for Mr. Glanvill's purpose, I see not. Hip-  
pocrates doth not blame him for anatomizing of animals, nor  
is surprized at the novelty, nor troubled at the impiety of the  
action. Democritus knowing what apprehension the peo-  
ple had of him, and fearing lest the garb and posture he was  
in might confirm to Hippocrates, the truth of the report tells  
him how he employed his thoughts, and that the Animals  
that lay there upon the ground, were not slaughtered by  
him in a frantick rage, out of hatred to the creatures of God;  
but cut up Anatomically by him, thereby to discover the  
seat and nature of the gall, and the effects it had upon Ma-  
niacks. Whereupon Hippocrates was wonderfully pleased  
with the testimony he gave of the soundness of his judgment,  
and after some other prudential discourses, departed, satisfied  
about the good condition of his Patient. But if Democri-  
tus were not out of his Wits, I believe Mr. Glanvill was to  
alledge such an impertinent story. But idle persons, that  
would upon easie termes acquire the repute of Learning, by  
citing quotations, are often thus imposed upon, and liable  
to mistakes. And perhaps there may be some person in the  
world that I know not of, who may have abused our Virtuoso  
in this case: but He should have minded the Text  
better.

What Pope Boniface the Eighth did, I know not. But I  
am apt to suspect a person that hath told me so many un-  
truths. The place in the Canon-Law, which I am apt to be-  
leeve Mr. Glanvill never saw: It is lib. 3. Extravag. titulo de  
sepultura. And Riolanus, whom I had rather credit, gives this  
account of it; *Inter Christianos Papa Bonifacius octavus bar-*  
*batum*



barum & inhumanum judicavit, peregre mortuorum corpora exenterare, carnibusque spoliare, ut ossa lecta & tersa in locum sepultura, quem vivi delegerant, commode perferri possent. It seems that Pope thought it an inhumane and barbarous thing not to dissect bodies for information sake; but to embowel them, and reduce them into Skeletons, and so to carry their bones to distant places to be buried according to the desire of the deceased. I am apt to think this Canon was never applied to Anatomy, and perhaps there is nothing of Excommunication in it, since Riolanus doth not mention it.

As for the gross errors in Anatomy which Galen is charged with, I know not one that incommodes a man in point of Practice, but that the Method he took (however founded on false principles) was secure and good. Upon which it happened that all his followers implicitly submitted to his Anatomical relations without further Enquiry, and taught his Errors for truths: And perhaps a certain vanity seized Galen to contradict the famous Herophilus out of dissected Apes, thereby to raise his own credit. However it was, from him arose most of the mistakes in Anatomy, that were translated to the Moors, and from them to our Ancestors. The Moors are said by their Religion, to forbid the meddling with dead bodies: Which Assertion, how true it is, I know not, because that Avicenne and Albucasis commend the study of Anatomy, as necessary in a peculiar manner to Chirurgeons. They practised sundry Chirurgical operations in Cauteries, and opening Arteries, which seemed to require an Experimental skill in dissections; and which were their own inventions. In fine, Averroes pleads not any scruples of Religion for his ignorance in Anatomy, but laments the Civil Wars of the Moors, which hindered him from inquiring by dissection into those controversies betwixt Galen and Aristotle, which he had occasion to debate. Yet did Averroes at all adventures, assert the credit of Aristotle against Galen, out of an emulation against Avicenne who was a Galenist. From these two great men amongst the Moors, as the knowledge of Physick and Philosophy, happened to be imparted to the barbarous Christians of the West, so was there a feud propagated betwixt the Philosophers,

Hinc [Galen] universi fidem dedere, ut nullus repperitus sit medicus, qui in Galeni Anatomicis voluminibus vel levissimum quidem lapsum deprehensum esse, non teque minus deprehendi posse censuerint. Vesalius in dedic. lib. de Fabric hum.

*sophers* and the *Physicians*; and the *controversies* were the more intricate, because the *Sciences* had not been so well translated out of *Greek* into *Arabick*, as was requisite; and they were worse put into *Latine*. After the taking of *Constantinople* by the *Turks*, when some learned men had fled thence into *Italy*, they began to impart unto the world new books, to acquaint the *West* with the *Greek* tongue, and with the *Greek* Works of *Hippocrates*, *Aristotle*, and *Galen*; and thereby multiplied many *Controversies* in the practice of *Physick*, about *Phlebotomy*, and *Purging*, and the like; especially about *bleeding* in a *Plurisy*, on which side it should be done. The contention was fierce, and some proofs being fetcht out of *Anatomy*, some persons were excited to enquire into *humane bodies* dissection, thereby to determine this controversy, and also the others betwixt *Aristotle*, *Galen*, and others. Amongst these *Vesalius* was (I had almost said) the first and principal, and by his indefatigable pains prevented much the industry of others. After him *Fallopianus* and *Eustachius* were the most remarkable; though many others came in with their little inventions to make up the cry, and failed not to supply the inutility of their discoveries with excessive clamor. What Apologies were made for *Galen* by *Sylvius*,

*Tet* neither are all the exceptions made by *Vesalius* against *Galen* allowable. *Galenum* aliquando in verbis potius quam in sententiis carpit, aliquando morulum (quod facere debuerat) minime excusat, ac saepe indignius, quam *Anatomæum*, *Philosophum*, ac *Medicum* tam insignem deceret, carpit ac accusat. *Fallopianus* observat. *anatom.* p. 3.

and others, would be tedious to relate; they being so ridiculous, and repugnant to common sense, that nothing could stop the growing glory of *Vesalius* and his followers. The issue of all was, that as *Hippocrates* lost no credit by an ingenious confession of his

mistake about the *Sutures* in the head of *Autonomus*; small errors being not observable in great Authors: So *Galen* still retained a great repute in the world, his other Works having advanced him above the effects of petty calumnies, or defaults. And the great *Guinterus Andemacus*, a competent Judge of old and new discoveries in *Physick* and *Anatomy*, gives this censure upon those curious Disquisitions:

*De vet. & nova med. comment.* 8. dial. 5 p. 261.

*Multa in rerum natura extant, quorum notitia non quidem Medicum aptiorem facit, sed medicina tantum profectum reddit.*



dit, Sic nulli ob accuratam illam, ne dicam curiosam nimis, partium corporis perscrutationem Medici excellentiores, sed ob curationes dextre sentatas absolutasque censentur. Ideo etiam Hippocrates, Galenus, Erasistratus, & plures id genus alii, tantum ex rerum natura & corporis humani fabricatione scrutari voluerunt, quantum ad medicinam probe exercendam ex usu esse putarunt. Non eadem enim semper omnibus similem ob causam conducunt. Sic Anatome aliter physicis inseruit, qui disciplinas ipsas propter se amant; alterii, qui illam non adeo affectant, sed nihil temere a natura factum esse demonstrant: aliter his qui argumenta (ut ille ait) ad actionem quandam vel naturalem vel animalem cognoscendam, ex partium humani corporis historia adferre nituntur: aliter medico qui manum aculeis, telonumque cuspidibus probe exprimendis vel alicui parti apte excidenda vel sinibus & fistulis & abscessibus incidendis adhibiturus est; quo Anatomes usn nihil aequae est necessarium.

Certainly it had been an action of greater ingenuity in our Novelists to have acknowledged the many excellent things that are in Galen, which are so advantageous to Physick, then to endeavour to render a man multi ingenii, multaue nihilominus habiturum, contemptible by the representation of a few defects in him, relating to things not much material to his profession. It must always be said of Galen, that he was the man who by his dextrous wit, happy practice, and great eloquence, as well as universal learning, did restore the glory of the Hippocratical Physick, which was in a manner extinct in his days. He again brought Anatomy into request, which had been slighted and dis-used so long: he himself dissected bodies privately, and publickly in the Temple of Peace; and amongst other Discoveries of his own, it is observable that he found out the use of recurrent nerves, whose influence upon the voice is such, that as they are pressed or cut into two, so a Dog becomes perpetually mute, or onely howls, never barks. Had that curiosity been but the discovery of some Novelists, what a noise would they have made? what boastings should we have had? But all that is good in Galen is passed by, and to make way for the glory of our new

Vide Colum-  
bum Anat. l.  
14. & Vesali-  
um de fabrica  
corp. hum. l.  
4 c. 5.

In-

Inventors, *Vesalius, Fallopius, Carcanus, Eustac hius, Ingras-  
sius, Columbus, Arantius, Varolius*, are not so much as men-  
tioned by Mr. *Glanvill*; to the end that we may (if we will)  
believe that it is the *genius of this Age* alone, which puts men  
upon discoveries, and that before them there were none that  
had merited this remark.

*Plus ultra,*  
pag. 13.  
Riolanus as-  
serts the first  
invention of  
the Valves in  
the veins to  
Hippocrates.  
*Anthropogr.*  
l. 5. c. 49.

Riolanus *Anthro-  
pogr.* l. 5. c. 49. *Mar-  
quard. Stegel.*  
de circul.  
fangui. l. 1. p. 7.  
*Bartholin.* in  
libello de  
venis c. 2.  
*Varolius Anat.*  
l. 1. c. 3 *Rio-  
lan.* *Anthro-  
pogr.* l. 2. c. 14.  
*Bartholin.* A-  
nat. l. 1. c. 1. c.  
11.  
*Plus ultra,*  
pag. 14.

“ I instance in the most remarkable of their discoveries  
“ briefly: and those I take notice of are, *The valves of the*  
“ *veins*, discovered by *Fabricius ab Aqua pendente*: The valve  
“ at the entrance of the Gut Colon, found as is generally  
“ thought by *Baughinus*.— I cannot think these to be so re-  
markable discoveries, but that he might have found out ma-  
ny more, since the time of *Vesalius*, I shall name one who  
gave a great light to the *Circulation of blood*, and that is the  
discovery which *Realdus Columbus* made, that the blood did  
pass through the Lungs out of the right ventricle into the  
left, and so into the *Aorta*, and all the body. As for the *val-  
ves in the veins*, I believe there are few that think that *Fabri-  
cius ab Aquapendente*, was the first discoverer of them: for  
they were shewed to *Fabricius* by father *Paul*, that famous  
*Venetian Monk*, as appears in his *life* written by *Fulgentio*,  
and extant in *English*. Neither indeed was Father *Paul* the  
first Inventour of them, for they are described before by *Ja-  
cobus Sylvius*, Professor of Physick at *Paris*, as *Riolanus*, and  
*Slegelius*, and *Bartholinus* do inform the world. And as to  
the valve in the beginning of the Colon-gut (if there be such  
a one, and that it be not rather a protuberant circle, arising  
from the joyning of the Ileon and Colon, as *Pavius, Falcobur-  
gius*, and *Riolanus* hold) whatsoever it be, it was discovered  
by *Varolius*, and called the *Operculum Ilei*, before that ever  
*Baughinus* was born, as *Riolanus* doth demonstrate: there  
are two others that may as justly pretend to it, to better me-  
rit the credit then *Baughinus*, and those are *Solomon Albertus*,  
whom *Bartholin* inclines unto; and *Joannes Poshius* of *Mont-  
pelier*, whom *Riolanus* also favours.

“ The Sinus of the veins, and their use found out by Dr. *Wil-  
lis*— I wonder Mr. *Glanvill* should not acquaint us with  
those particular Sinus which Dr. *Willis* should finde out; for  
since



since in common discourse, when we speak undeterminately of the *Sinus*, we understand those of the *brain*, it did become him to tell us which others he meant: lest a man that knew his skill, should apprehend him so ignorant as to think that Dr. Willis had newly found out those *Sinus*, one whereof hath for above two thousand years born the name of *Herophilus*, and was called *Torcular Herophili*, in Greek *Ανρός*. But I shall be so favourable as to think that these are not the *Sinus* he meant, Dr. Willis having tried nothing more in prosecution of them, then to pursue the *Circulation of the blood* there by the injecting of *Inkish liquor*, whereas *Wepferus* used a *tincture of Saffron*; and *Bartholin* evidenced the same thing by a pair of bellows, or tube and winds insufflated. I do beleieve that He, or they that suggested this to him, did mean the *Sinus* or *vena vertebrales*, which are described exactly in the Doctors Book, in the thirteenth Table. But I must tell him, that whatsoever there is in that Piece, which is *Anatomical*, the glory thereof belongs to Dr. Lower, whose indefatigable industry produced that elaborate Treatise; and any man that knows the great practice of that other Doctor, will grant, that although he could not want abilities, yet he wanted leisure to attend to such painful and tedious inquiries. Dr. Willis indeed candidly doth relinquish this honour to Dr. Lower, and his pains deserved your commendation (Mr. Glanvill) if that be of any value, so much more then those other inventions that are celebrated by the *Virtuosi*, by how much the subject was more minute and subtle which he was to trace. All that Dr. Willis contributed, that I hear, was the discourses and conjectures upon the *Anatomical deductions* of Dr. Lower, which as ingenuous as they are, I am sure neither are, nor ever will pass all for inventions. But in the case I now mention, I am confident that Dr. Lower is so ingenuous, as to acknowledge that what He exhibits there, is taken out of the *Cuts* of *Varolius*, as far as where they empty themselves into the *subclavian veins*: but I think that as to the *Synus*, or *veins*, and *arteries* all along the *Spine*, as there is not any Cut of them extant before that I hear of, so I allow them to pass as his invention: but the accurateness of his *Neurology* equals to the best Inventors.

N

But

Dr. Willis de  
cerebro c 6.  
p. 82, 83.

Jo. Jac. Wep-  
ferus Apo-  
plex. p 116.  
Bartholin. A-  
nat. l. 3. c. 7.

But if Mr. *Glanvill* injur'd Dr. *Lower* in attributing what he invented unto Dr. *Willis*, he will not conceal his own discoveries, you shall see what a *Divine* can do in *Physick*. 'St. St'! I adde the *origination of the Nerves*, which were of old supposed to arise out of the substance of the *brain*, but are found by late *Anatomists* to proceed from the *medulla oblongata*. This is such an *Addition* as becometh our *Novelists*, most that they pretend unto being no more then Mr. *Glanvill* here boasts of; and which is so pitiful an accessional in *Anatomy*, that none ever bragged of it, or upbraided the *Ancients* about it, that I remember, except *Bartholin* may be said to do it. As to the late *Anatomists*, unto whom he ascribes this *invention*, I would he had told their names. The difference betwixt the *cerebrum*, *cerebellum*, and *medulla oblongata*, is a modern (but not very late) distinction. Some have made the *medulla oblongata* and the *spinal marrow* to be but productions of the *brain* and *cerebellum*, from whence it raiseth it self by four *foundations* or *roots*: the discrepancy betwixt that and the other parts whence it is *originated*, not being such as to justify any great contest about it: since it is the usual course of *Nature* in its progress from the union of two different bodies, to produce an *intermediate substance*, participating of the nature of both. *Spinalis medulla ortus*

Vol. Coiter. observ. anatom. miscel.  
Ex substantia cerebri & cerebelli quatuor  
radicibus oritur primum truncus insignis,  
Medulla Spinalis appellatus, ex quo multi  
emergunt surculi, nomine nervorum insi-  
gniti. *Varolius* Anatom. l. i. c. 13. p. 12.

*principium rectius cerebro atque cerebello acceptum fertur, unde non immerito caudex, sive processus, sive soboles cerebri appellatur: nam vix in ullo, nisi in durtie (est enim cerebro aliquanto solidior & firmior) videtur a cerebro differre.* Some have made the *brain* & *cerebellum* to be productions of the *spinal marrow*, which enlargeth it self within the *skull*, and generateth those two *Apophyses* called the *cerebrum* & *cerebellum*. In fine, it doth not appear that the *Ancients* mistook much the place of the *origination of nerves*, if you reckon amongst them *Vesalius* and *Fallopianus*: but they said they rose all from the *brain*, understanding by that word all that which is included within the *skull*, and termed that to be the *spinal marrow*, which was without the *skull*, and whence those other *paria nervorum*



rum seem to rise, which *Anatomists* describe. And this subtilty of Mr. *Glanvill* is so little regarded by late *Anatomists*, that *Mœbius* (a man of as great note as most are) flights it by the example of *Hofman*, whose sense I shall here report: *Monendi sunt adolescentiores, ne forte morentur illos qui neglecta veteri distinctione dicunt, Omnes nervi sunt a medulla, sed alii ex illa, antequam cranio excidat, alii ex eadem, cum jam in spinam delapsa est, & Spinalis dicitur. Quid enim*

*Mœbius* fundament med. c. de usu nervor. p. 606. *Caspar Hofman.* Instit. med. l. 2. c. 65. sect. 1.

hoc aliud est, quam frustranea nominum novatio? Cum dico me de nervis ex cerebro ortis acturum, intelligo totum id quod cranio continetur. There is another Origination of the nerves, which is as ancient as *Aristotle*, and which *Hofman* and *Vander Linden* assert, whereby they are deduced immediately and formally from the brain, but immediately and materially from the heart; for so much as they hold each nerve to be an Artery vested with the membranes of the brain,

So Dr. *Charlton* in his Discourse to the Royal Society concerning the BRAIN, takes the liberty to understand by the Cerebrum as well as others, totum illud corpus quod Calvaria concavo continetur (pag. 67. de Propr. cerebri humani) though afterwards, when he comes to speak more accurately, he treats of the Medulla oblongata thus: Cerebro proxime subijcitur alma nervorum, ad sensus spectantium mater, & funis argentei (sicut Sapiens in Ecclesiaste eleganti sed obscura Allegoria vocat Medullam spinalem) principium Medulla scilicet intra cranium oblongata. Behold the addition of Mr. *Glanvill*!

and so issuing to several parts. This opinion is very agreeable to the observations that occur in the practice of Physick, and their arguments seem to me so plausible, that I am so averse with Mr. *Glanvill* to proclaim a new origination of the nerves, that I much doubt whether the followers of *Galen* were not deceived, and the *Peripateticks* in the right. See *Vander Linden* Disp. 38. de vasis & nervis, and *Hofman* de partib. similar. in thes. de orig. nerv. sec. *Aristot.*

It is clear now that Mr. *Glanvill*'s new addition amounts onely to this, that the *Ancients* did some of them hold that the nerves had their original from the brain; others deduced them from the heart. Some (perhaps before *Varolius*) did subdivide the brain into several parts, and said that the nerves had their origination from the medulla oblongata, and not from the cerebrum and cerebellum. This nicety Dr. *Willis* makes some use of, but since he explicates no-

Vide *Varolium* l. 1. c. 3.

If *Varolius* found it out, as I believe he did, by a peculiar way of dissecting the head, what is it that Mr. *Glanvill* then adds? I am sure that *Fracassatus* saith, *Varolius* primus principium Spinalis medulle vel intra cranium solum esse in nervis, quorum origo olim a cerebro petebatur, docuit.

thing of the *brain* with a *mechanical accurateness*; I shall only subjoyn, that whosoever shall view or eat that which they call *Medulla oblongata & spinalis*, and compare it with the marrow that is in the bones otherwise, he will think it a less impropriety of speech, to say the *Medulla oblongata* is a part of the *brain*, then to term it a *Medullary substance*.

"And though the *Succus Nutritius* be not yet fully agreed upon by Physicians, yet it hath so much to say for it self, that it may not unreasonably be mentioned amongst the new Inventions—— It's strange Mr. Glanvill should entitle this opinion about the *Succus Nutritius* to so great a degree of probability, as he doth. Physicians are so far from being fully agreed upon it, that, excepting Dr. Glisson, Dr. Charleton, and perhaps one or two more, the rest do generally reject it. Dr. Highmore, Dr. Willis, and Bartholine have written against it; and so hath Deusingius writ a particular discourse against it. Nor do I doubt, but whosoever peruseth those Authors which I refer unto, will be so far from imagining it reasonable to ascribe the *Succus Nutritius* to the number of modern Inventions, that he will term it at best but an ingenious Paradox, which when the first surprise is over, vanisheth with the appearance of being ridiculous. How much doth our *Virtuoso*, and Bartholine differ? Prodeat Herophilus, ex autro educatur Democritus, advocentur prosectores cujuscunque sortis & atatis, si in dissectione corporum nervis ullum invenerint liquorem nutritioni opportunum, nolim inter eos locum mereri.

"But of all Modern Discoveries, *Wis* and *Industry* have made in the *Oeconomy* of humane nature, the noblest is that of the *Circulation of the blood*, which was the invention of our deservedly famous *Harvey*. 'Tis true, the envy of malicious Contemporaries would have robb'd him of the *Glory* of this *Discovery*, and pretend it was known to *Hippocrates*, *Plato*, *Aristotle*, and others among the *Ancients*; but who ever considers the expressions of those Authors, which are said to respect the *Circulation*, who finde that those who form the inference, do it by a faculty that makes all kind of *Compositions* and *Deductions*, and the same that assists

"the

Highmore de  
affect. hypo-  
chondr. c. 4.  
Willis in Ana-  
tome cerebri  
c. 20.  
Bartholin spi-  
cileg. l. c. 3.

Bartholin.  
spicileg. l. de  
vasis lym-  
phat. p. 23.

Plus ultra,  
pag. 15.



"the *Enthusiasts* of our days, to see so clearly all our altera-  
 "tions of *State and Religion*, to the *minutest particulars* in  
 "the *Revelation of Saint John*. And I think it may be as  
 "well concluded from the first chapter of *Genesis*, as from  
 "the *remains* of those *Ancients*, who if *they* had known  
 "this *great and general Theory*, how chance they speak no  
 "more of a thing, which no doubt they had frequent oc-  
 "casions to mention? How came it to be lost without  
 "Memory amongst their followers, who were such *su-*  
 "*perstitious Porers* upon their Writings? How chance  
 "it was not shewn to be lodged in *those Authors* before the  
 "days of *Dr. Harvey*, when *Envy* had *impregnated* and de-  
 "termined the *Imaginations* of those who were not wil-  
 "ling any thing should be found anew, of which themselves  
 "were not the *Inventours*? But 'tis not only the re-  
 "mote *Ancients*, whom time hath *consecrated*, and di-  
 "stance made *venerable*, whose *Ashes* those *fond men* would  
 "honour with *this discovery*; but even much later Au-  
 "thors have had the glory fastned upon them. For the  
 "Invention is by some ascribed to *Paulus Venetus*; by o-  
 "thers to *Prosper Alpinus*; and a third sort give it to  
 "*Andreas Casalpinus*. For *these*, though either of them  
 "should be acknowledged to be the Author, it will make  
 "as much for the design of my discourse, as if *Harvey*  
 "had the credit: and therefore here I am no otherwise  
 "concerned, but to have *justice* for that excellent man:  
 "and the World hath now done *right* to his *Memory*,  
 "Death having overcome that *Envy* which *Dogs living*  
 "*vertue* to the *Grave*; and his *Name* rests quietly in  
 "the *Armes of Glory*, while the *Pretensions* of his *Rivals*  
 "are creeping into *darkness* and *oblivion*.

Whether those that have gone about to deprive *Dr.*  
*Harvey* have been incited by *Envy* and *Malice*, it is  
 hard for any *considerate* man to judge; since those which  
 first proposed the *doubt* about the *Author*, were great friends  
 to the *Theoreme*; such as *Wabaus*, who first mentioned it;  
*Riolanus*,

Riolanus, Nardius, Fracassarus, and Joannes Antonides Vander Linden: All of them pay a great respect to Dr. Harvey's Performances; All of them concur with him generally in his Assertions, saving that Riolanus made some variation therein, and perhaps his passion might blinde his candour; though I do not think so, because I finde him zealously vindicating of Dr. Harvey from those imputations by which Walaus endeavoured to transfer the credit of the invention upon Father Paul.

Another thing I must take notice of is, that Mr. Glanvill speaks very peremptorily about a thing he hath not enquired into, for it is evident that he never read the passages out of the Ancients, which are cited by Walaus and Riolanus, to shew they were not altogether ignorant of that motion of the blood which is called Circulation. He thinks it may be as well concluded from the first chapter of Genesis, as from the remains of the Ancients. And why so? Is there any thing mentioned in the first chapter of Genesis, that sounds like the Circulation of the blood, or any words that can be applied unto this late discovery? not one. But any man that understands Greek, must confesse that the words ἀνωγίς, πλημυρίς, and περίοδο in Hippocrates (whatever he meant by them) do most emphatically signifie the Circulation of the blood, as it is now proposed. If I merit not to be believed herein, take the judgement of Julius Casar, Scaliger upon Aristotle de insomn. xiiij. 1444. Ποταμοὶ ὃ μὴ κατὰ τρόπον γινόμενοι, αἷμα ὅ. περίοδον σημαίνουσι. I shall not from this place deduce the mystery of the Circulation of the blood, by saying that rivers circulate under ground thorough that sandy earth, which those that dig in Wells, when they come unto, they can descend no further: (which Helmont in the Brabant Dialect calls *Quellem*, other Dutch-men name *Well-ground* and *Well-sand*, and after return unto the Sea again by open Channels: But whatever the intent of the Philosopher was, that αἷμα ὅ. περίοδον, properly imports such a thing, and that we have the name given it by Aristotle, this Scaliger confesseth, *Ejus ad apotelesma xxxi. hac sunt verba. Αἷμα ὅ. περίοδον, motum; ut in febribus accessionem. Circuitum* Calvus



*Calvus cum dicit, fideliter, non pleno explicat. Neque enim. circumducitur sanguis, ut περιόδῃ impleat significationem. Nam in febribus idcirco dicitur περιόδῃ, quia revertitur paroxysmus: quasi circumductus ob diem parum & vacuum a morbo.* From which it is evident, that if Scaliger had known that the blood had *circulated*, he would have granted it to have been properly expressed here in the *Text*: which is more than He would say of any *Apocalyptical* discoveries, or *deductions* of that opinion out of the first Chapter of *Genesis*. And if the word περιόδῃ be so *significant*, it is hard to deny that *Hippocrates* did not set down the thing it self in this passage, *Ἀι φλέβες διὰ τὸ σῶμα ἅλῃ κεχυμένα, πνεῦμα, καὶ ρεύμα, καὶ κίνησιν παρέχονται ἀπὸ μίης πολλαὶ διαβλασάνεσι. Καὶ αὕτη μὲν ἡ μία ὅθεν ῥέεται, καὶ ἡ τέλελεύτηκεν, ἐκ οἷδα. Κύκλος γὰρ γεγεννημένων, ἀρχὴ καὶ ἐνρήθη. Vena per corpus fusa spiritum, & fluxum, & motum præstant. Ab una multa propagantur: sed illa una unde incipiat, ut ubi desinat, non scio. Circulo enim ducto, principium non invenitur.* And in that other; *Ἐς τρεῖς χας τροφή, καὶ ἐς ὀνυχας καὶ τὴν ἐσχάτην ὅτι φαίνεται ἐνδοθεν ἀφικνέσθαι. Ἐξωθεν τροφή ἐκ τῆς ἐσχάτης ὅτι φαίνεται ἐξωδὸν ἀφικνέσθαι. Σπύρρα μία, ξύμπνοια μία, συμπαθέα πάντα. Καὶ μὲν ἐλομελὴν πάντα καὶ αὐτὰ μέρῃ. τὰ δὲ ἐκαστὸν μέρος μέρος πρὸς τὸ ἔργον Ἀρχὴ μεγάλη εἰς ἐσχάτον μέρος ἀφικνέσθαι. Ἐξ ἐσχάτου μέρος εἰς ἀρχὴν μεγάλην ἀφικνέσθαι. In pilos alimentum [id est, sanguis nutriendus] & in ungues, atque extremam superficiem intus advenit: faris alimentum ab extrema superficie intus revertitur. Corripiatio una, conspiratio una, consentientia omnia. Certe quod ad communem naturam omnia: in quavis parte partes ad opus. Principium magnum [id est Cor, per transmissos spiritus & sanguinem] ad extremam partem pervenit: ab extrema parte ad principium magnum revertitur.* There are more passages in the same *Author* which seem to import the same thing, though his usual *brevity* and *obscurity* is such, that had not *Harvey* and others dilucidated the point, we had never, I believe, fixed this *explication* upon him, which amounts to no more than a *new gloss* upon an *old Text*: which yet is sufficient to check the largeness of Mr. *Glanvills* assertion. The περιόδῃ of *Plato*, and his making the *Heart* to be the original

Hippocrates  
de off nat. t.  
17.

E: lib. de a-  
lim. t. 4 12.

Plato in Timæo  
m. 21.

of the veins, καὶ τὰ περιφερειῶδες καὶ πάντα τὰ μέλη σφοδρῶς αἵματι; these are something more then is to be found in the first of *Genesis*. And that passage of *Aristotle de Gen. Anim* l. 4. c. ult. is so unlike any thing of *Moses's*, and so like to the doctrine of *Harvey*, that any man must blame Mr. *Glanvill*, for rashness of what he says. The words are thus set down by *Riolanus*, and I have not the *Original* by me to consult: *Cum coelestia corpora circulariter moveantur, inferiora corpora motum illum imitari debent, cumque Oceanus fluxu & refluxu moveatur ab influxu Lunari, similiter humores talem motum habere necessum est.* Which words seem clear enough, so as to justify the *Epiphonema* of my *Author*, in opposition to our *Virtuoso*. *Quid ista significant nisi sanguinis Circulationem.* He that would be informed more fully about the judgement of the *Ancients*, whether there be any thing in them that discovers the *Circulation of the blood*, to have been known unto them; or that they were not totally ignorant, and without any apprehensions of it: let him read the first letter of *Walaus*, and the several Pieces of *Joannes Riolanus* about the *Circulation of the blood*, and the disputations of *Vander Linden* about the *Circulation of the blood*, in which he vindicates it in a prolix discourse unto *Hippocrates*. I wil not trouble my self to transcribe them: It is evident that all men do give unto *Harvey* the credit of having so explicated it, and *Anatomically* proved it, that he may as well be termed the *Author* of it, as *Epicurus* and others the *Authors* of that *Philosophy* which they derived from *Pythagoras*, *Democritus*, *Leucippus*, and *Ocellus Lucanus*. Nor hath *Harvey* any other *Plea* and *Right* to the *Invention*, then that he did more fully and perspicuously declare it, and in the most judicious and solid manner assert what others had but hinted at, or faintly insisted on.

Nor is Mr. *Glanvill* any better acquainted with the notions of the *Modern Writers*, then he is with those of the *Ancients*. He saith, that some have ascribed the *Circulation of the blood* to *Paulus Venetus*. I must inform the Reader (who may easily mistake, if he be one of the ordinary *Comical Wits*) that it is not to be ascribed to *Paulus Venetus*, the great *Traveller*,



veller, who is generally understood, when *that name* is mentioned; none can say that *he* brought it from the Kingdom of *Cathay*. But *Pater Paulus Sarpa* (or *Serpa*) or Father *Paul*, the famous *Venetian* Monk, of the order of the *Servi*; who signatified himself during the time that *Venice* was interdicted. He was a Student at *Padoa* at the same time that *Harvey* was there, and discovered to *Aqua pendens* the valves in the veins, which discovery that great *Anatomist* appropriated to himself; and so *Harvey* was thought to have abused the same Father. But since *Fulgentio* in the life of *Padre Paolo* doth not challenge *Harvey* for this Cheat, as he doth *Fabricius* for that other; and since *Marquardus Slegelius* could not hear of any such thing upon a strict Enquiry at *Venice* and *Padua*, I know not any since *Walaus* and *Franciscus Ulmus*, that have ascribed the invention to *Paulus Venetus Servita*.

Vide Slegel.  
de moru San-  
guin c. 2. &  
Riolan. in  
not. ad ep.  
Walai.

Neither did I ever reade of any man that attributed it to *Prosper Alpinus*: nor is it credible that any ever did so. For that great *Physician* established his glory by being an excellent *Practitioner*, and not by any *Anatomical* curiosities, which he rather contemned, then pursued: and till I know what Author *Mr. Glanvill* follows, I believe the mentioning of him was occasioned by that way of discourse which is common to the *Wits* of this Age, to blunder out any thing: and by laughing at improbabilities (of their own suggestion) to explode substantial truths, or represent them as forgeries. But if any did deceive the world in attributing the Circulation of the blood to *Padre Paolo* and *Prosper Alpinus*, it doth not follow but that *Andreas Casalpinus* was the first Inventor of it, and proposed it to the world in his *Medical* and *Peripatetical Questions*, though not in any Set Discourse, but as it casually falls into the discussion of other Problems: Whereupon it was little regarded, and not enquired after; the book being also scarce, and he being of that faction of *Physicians* which adheres to *Aristotle* against *Galen*, whence it hapned that few read his *Paradoxes*, and one of the bravest men of the latter Age hath been almost buried in oblivion. However, an ingenious *Florentine*, call'd *Joannes Nardius*,

hath asserted the repute of *Andreas Casalpinus*, for pre-  
cedency to *Harvey* in the *Discovery*; nor doth the same *Author*  
doubt, but that *Erasistratus* was of the same opinion: but he  
saith of *Casalpinus* this: *Fœlix cui contigit post mortem nan-*  
*cisci clarissimum Patronum Guglielmum Harveium Regium*  
*Medicum, nobisque per charum, qui abortivam illam opinio-*  
*nem excoluit adeo, ut nihil cultius nostro seculo, nilque mirabi-*  
*lius occurreret curiosis & amanarum literarum amatoribus.* To  
decide this question, and to put an end to those disputes which  
trouble some of our *Virtuosi* so much, by reason of that little  
converse they have with *Books*, I shall draw out the opinion  
of *Casalpinus*, as he expresseth himself in his *Dispu-*  
*tations*.

*Andreas Ca-*  
*salpinus Qu.*  
*peripatet. l. 5.*  
*qu. 3.*

As a great abettour of *Aristotle*, he avows that the *Heart* is  
the principal part in man, and the original of the *veins*, *ar-*  
*teries*, and *nerves*; which is the opinion of *Hofman*, *Van der*  
*Linden*, and other *Aristotelian Physicians*.

*ib. qu. 4.*

He describes the *Fabrick* of the *Heart* as exactly as any  
of the *Circulators* in reference to the *Valves*, so much talked  
of; but he declares not their shape: *Vasorum in Cor. desinen-*  
*tium quadam intromittunt contentam in ipsis substantiam, ut*  
*vena Cava in dextro ventriculo, & arteria venalis in sinistro:*  
*quadam educunt, ut arteria aorta in sinistro ventriculo, & vena*  
*arterialis pulmonem nutriendi in dextro: omnibus autem mem-*  
*branule sunt appositæ & officio delegatæ, ut oscula intromittentia*  
*non educant, & educentia non intromittant.*

And for the account of the *Vena arteriosa*, and *Arteria*  
*venosa* in the *Lungs*, *Harvey* is not more perspicuous, then  
he is afterwards, where he makes the one to be an *Artery*, the  
other a *veine*, viz. *Putaverunt autem Medici usum hunc non*  
*videntes commutata fuisse vasa in pulmone, ut Arteria quidem*  
*similis esset vena, vena autem similis Arteria: appellantes ve-*  
*nas vasa omnia quæ in dextrum ventriculum desinunt, Arterias*  
*autem, quæ in sinistrum: signum multa & absurditates excogi-*  
*tantes ut usum invenirent. Pulsat igitur in pulmone vas dextri*  
*ventriculi, hac enim e corde recipit, ut Arteria magna, & si-*  
*militer fabricatum est ejus corpus. Vas autem sinistri ventri-*  
*culi*



*culi non pulsatur, quia introducit tantum, & ejus corpus simile est reliquis venis.*

He holds that the *motion* of the *Heart* and *Arteries* depends not upon any *pelfick Faculty*, but that it ariseth from the *ὀρχωσις*, ebullition, or *effervescency* of the blood in the *Ventricles*; and that the *Heart* and *Arteries* are *dilated* at the same time, the blood dilating the *Heart*, and issuing out thorough the *valves* of the *Aorta* and *Pulmonique Artery* at the same instant, which is pure *Cartesianism*.

He holds that the *Blood* comes up from the *veins* to the *Heart*, and there acquires the last *Perfection*, and becomes vital and *spirituous*: in the mention of the *Arterious Blood*, he useth indifferently the termes of *Blood*, *spirit*, and *natural heat*, which I desire may be observed, lest the *proofs* seem not full enough, and he be construed to speak of nothing but *spirits* and *natural heat* in the *Arteries*. He saith, that this *Blood* having acquired its *Perfection* in its passage through both the *ventricles*, is distributed through all the parts of the *body*, for its nutriment by the *Arteries*, in which *Arteries* there is such a constant quantity of *Blood*, that the *effervency* of that in the *Heart* impells the whole continuation of the *Arteries*, so that they beat all at once.

*Cum enim pulsatio Cordis & Arteriarum sit accidens quoddam quod ex necessitate insequitur humoris in corde effervescentiam, qua sanguinis generatio perficitur, ut in ceteris quae igne elixantur, accidit. lib. de vita & mort. c. 2. intumescente corde necesse est simul omnes Arterias dilatari, in quas derivatur fervor: non enim repleti potest una pars, quin totum fiat majus: ubi non omni ex parte vasa quae continua sunt fuerint exinanita. Nam nullo intus existente corpore, non contingit simul repleti principium & extrema, cum motus non fiat in instanti: existente autem per totos canales aliquo spiritu, simul ac in principio alius fuerit genitus, necesse est totum simul dilatari, unum enim sit spiritus accedens cum toto. Cum ergo totum reddatur majus simul ac accesserit pars, non potest una pars dilatari, quin eodem tempore dilatetur totum.*

Mark this, where he makes the Heart and Arteries to be one continued receivance of perfect blood: by which you must explain what he says in some places, as if only spirits or natural heat went into the Arteries, or returned by the veins.

*Est autem veluti totum quoddam Arteria omnes cum corde; Continuum enim est vas sanguinis perfecti. Spiritu autem efflante inhabitum corporis, & distributo particulis sanguine, necesse est tumorem vasorum desiderare, quæ est pulsus contractio. Continue autem hoc fit, quia continua est partium nutritio, & continua sanguinis generatio in corde. Elevatio igitur Spiritus a calore fit, non tamen temere, sed alicujus gratia. Nam sine hujusmodi amplificatione non fieret distributio alimenti in omnes partes.*

He plants a kind of *Flammula cordis*, or fire in the heart, which causeth the ebullition, and imprints a spirituousness in the blood that issueth out into the Arteries. *Hujusmodi locus Cor est in quo secundum Naturam elementum præparatum ardere possit, & fieri spiritus: vena alimentum suppeditant, Arteria flamma spiritum recipiunt.*

He saith, that the Blood moves towards the Heart, as the Oyle to the flame of the burning Lamp, and that the Valves as the orifice of the *Vena Cava* which immit the blood, are placed there to moderate the source of the blood, lest it should fall in too fast, & extinguish the vital fire: and that the valves at the entrance of the *Aorta* do flie open upon the effervescency of the blood, by the pressure of it every way, to get more room: it finding no out-let but by those yielding valves, which were so placed, lest upon any accident, or violent passion, the arterious blood should regurgitate into the Heart, *Motus fit ex venis in Cor caliditate alimentum trahente, ex corde autem in arterias, quia hac solum patet iter propter membranarum positionem, posita autem sunt hoc modo membrana, ne unquam contingeret contrarium motum fieri, quod accidere posset in vehementibus animi perturbationibus, aut aliis causis, a quibus sanguinis retractio fit ad Cor: Obsistunt enim huic motui membrana. Nam si hoc modo condite non essent, ignis cordis vel levi causa extingueretur. Si enim motus fieret contrarius simile esset, ac si flamma compingeretur deorsum ad alimentum, quod cum minime sit præparatum, aut copiosius quam oportet, ignem suffocat. Oportet enim alimentum præparari, & paulatim dispensari ad locum flammæ.*

He saith that this arterious blood, or spirit, is distributed into



into all parts of the *body*, with great *celerity*, and that it is that which *nourisheth the parts*: and that upon its diffusion into the *habit of the body*, the *spirits* are very much *exhausted*, and the *corpulent* part of the *aliment* doth remain, being coagulated partly by *heat*, and partly by *cold*.

He saith, that the variety of the *pulse*, as to *strength* or *debility*, *celerity* and *slowness*, depends upon the nature of the *vital fire*, the nature of the *aliment* with which it is fed, and sometimes upon the particular *Fabrick*, or conformation of the *Heart*, in which that *Fire* is seated.

He placeth *Anastomoses* betwixt the *veins* and *arteries* every where in the body. *Osculorum communio est non solum in corde, sed etiam per totum venerum & arteriarum ductum,*

He saith that the blood is never *extravasated*, but where it is aggregated to any part by way of *nourishment*, or else it *putrifies*: he doth not understand how it should not *coagulate* if once *extravasated*; nor can he comprehend how it should be reassumed into the *veins* in such a case. *Venam continuam esse oportet, usque ad cordis ventriculos, ut inde omnis virtus descendat: nec ullibi contingit disjunctam esse; sanguis enim calore cordis destitutus concrevit, & tandem putrescit.*

He makes the *Blood* to pass betwixt the *right* and *left* ventricle of the *Heart*; partly by the *Lungs*, and partly by the *Septum Cordis*. *Pulchre igitur condita sunt omnia. Cum enim fervere oporteret in corde sanguinem, ut fieret alimenti perfectio: primo quidem in dextro ventriculo, in quo crassior adhuc continetur sanguis, deinde autem in sinistro, ubi sincerior sanguis est: partim per medium septum, partim per medios pulmones refrigerationis gratia ex dextro in sinistrum mittitur. Interim autem pulmo abunde nutriri potest: totum enim cum sanguinem absorbere, quem recipit, egreditur fines rationis. Non enim rara esset ejus substantia & levis, ut videtur si tantum alimenti, vim in suam naturam converteret. This he thus further explains. Pulmo per venam arteriis similem ex dextro cordis ventriculo fervidum hauriens sanguinem, eumque per anastomosi in arterie venali reddens quæ in sinistram cordis ventriculum tendit, trans-*  
misso

misso interim aere frigido per aspera arteria canales, qui juxta arteriam venalem protenduntur, non tamen osculis communicantes, ut putavit Galenus solo tactu temperat. Huic Sanguinis Circulationi ex dextro cordis ventriculo, per pulmones in sinistrum ejusdem ventriculum optime respondent ea quæ ex dissectione apparent. Nam duo sunt vasa in dextrum ventriculum desinentia, duo etiam in sinistrum. Duorum autem unum intromittit tantum, alterum educit, membranis eo ingenio constructis. Vas igitur intromittens, vena est magna quidem in dextro, quæ cava appellatur: parva autem in sinistro, ex pulmone introducens, cujus unica est tunica, ut cæterarum venarum. Vas autem educens Arteria, est magna quidem in sinistro, quæ Aorta appellatur, parva autem in dextro ad pulmones derivans, cujus similiter duæ sunt tunicae, ut in cæteris arteriis.

He holds that the *spirituous* or *arterious* blood is cast out, and diffused vigorously into the *habit* of the body, that the *veins* and *arteries* being continuous by *Anastomosis*, it returns to the *Heart* again, vigorating the blood of the *vena porta* and *Cava* as it returns: which is sufficiently intimated in that he deduces all the *vigour* and *vitality* of the blood from the *Heart*, and that this *vigour* or *natural heat* is carried over the body by the *Arteries* alone, and that it is necessary that the whole *venous Systeme*, or contexture of *Arteries* and *veins* be continuous, lest the blood in the *veins*, being destitute of the *cordial heat*, should coagulate and putrifie. He holds that this motion, or *Circulation of the blood* is without intermission: and that the swelling of the *veins* upon the *Ligature* is a sufficient proof of it. But he holds, that the recourse of the blood by the *veins* is greater in the *sleep*, then when we *awake*; which he proves thus, in that the *veins* are more full and tumid during *sleep*, then *waking*: and the *pulse* weaker, and more *slow*; as any man may observe. From whence he concludes, that the *natural heat* (which is the *Arterious blood*, as I observed before, to prevent all possible mistakes) which was otherwise in great part expended upon the *nerves* and *sensories*, doth in *sleep* return: and fill the *veins* more visibly (that exhaustion ceasing) then when we are not *asleep*.



His opinion will be best set down in his *own words*; and I think it necessary to do it, because *Nardius* hath done it so imperfectly, that one would attribute as little to his *allegations*, as to those which are cited out of the *Ancients*; and if I had not read *Casalpinus* long before, I should have thought the *Florentine* to have intitled *Casalpinus* to the opinion out of envy to *Harvey*, or out of a partial desire to advance the glory of the *Tuscan Academy* at *Pisa*, when *Casalpinus* was Professor. Thus that learned man writ about the year 1590. or a little after.

*Andreas Casalpinus Quest. Medic. l. 2. Qu. 17.*  
*Edit. Venetæ secundæ in 4<sup>to</sup>. A. D. 1593. fol.*  
 234. col. 1.

‘Sed illud speculatione dignum videtur, Propter  
 ‘quid intumescunt venæ ultra locum apprehensum, non  
 ‘citra: quod experimento sciunt qui venam secant:  
 ‘vinculum enim adhibent citra locum sectionis, non  
 ‘ultra: quia tument venæ ultra vinculum, non citra.  
 ‘Debuiſſet autem opposito modo contingere, si mo-  
 ‘tus sanguinis & spiritus a visceribus fit in totum  
 ‘corpus: intercepto enim meatu, non ultra datur pro-  
 ‘gressus: tumor igitur venarum citra vinculum de-  
 ‘buiſſet fieri. An solvitur dubitatio ex eo quod scri-  
 ‘bit *Aristoteles*, de Som c. 3. ubi inquit, *Necesse enim*  
 ‘quod evaporatur aliquousque impelli: deinde converti  
 ‘& permutari, sicut *Euripum*: calidum enim cujusque  
 ‘animalium ad superiora natum est ferri: cum autem  
 ‘in superioribus locis fuerit, multum simul ite-  
 ‘rum revertitur, ferturque deorsum. Hæc *Aristoteles*.  
 Pro

'Pro cuius loci explicatione illud sciendum est :  
 'Cordis meatus ita a natura paratos esse, ut ex *vena*  
 'Cava intromissio fiat in Cordis ventriculum dex-  
 'trum, unde patet exitus in *pulmonem* : ex pulmone  
 'præterea alium ingressum esse in Cordis ventriculum  
 'sinistrum, ex quotandem patet exitus in *Arteriam*  
 'Aortam, membranis quibusdam ad ostia vasorum  
 'appositis, ut impediunt retrocessum : Sic enim  
 'perpetuus quidam motus est ex vena cava per *Cor* &  
 'pulmones in *Arteriam Aortam* : ut in *Questionibus*  
 'Peripateticis explicavimus. Cum autem in *vigilia*  
 'motus caloris nativi fiat extra, scilicet ad sensoria :  
 'in *Somno* autem intra, scilicet ad *Cor* : putandum  
 'est in *vigilia* multum spiritus & sanguinis ferri ad ar-  
 'terias, inde enim in nervos iter est. In somno au-  
 'tem eundem calorem per *venas* reverti ad *Cor*, non  
 'per *Arteriam*. Iudicio sunt pulsus, qui expergis-  
 'centibus fiunt magni, vehementes, celeres, & cre-  
 'bri, cum quadam vibratione : in somno autem  
 'parvi, languidi, tardi & rari notante *Galeno*. 3. de  
 'caus. pul. 9, 10. Num in *Somno* calor natus minus  
 'vergit in *arterias* : in easdem erumpit vehementius  
 'cum expergiscuntur. *Vene* autem contrario se-  
 'modo habent : nam in somno fiunt tumidiore, in  
 'vigilia exiliore, ut patet intuenti eas quæ in manu  
 'sunt. Transit enim in somno calor natus ex ar-  
 'teris in *venas* per osculorum communionem, quam *A-*  
 'nastomofin vocant, & inde ad *Cor*. Ut autem sangui-  
 'nis exundatio ad superiora, & retrocessus ad inferiora  
 'ad instar *Euripi* manifesta est in somno & *vigilia*, sic  
 'non



*non obscurus est huiusmodi motus in quacunque parte corporis vinculum adhibeatur, aut alia ratione ocludantur vena. Cum enim tollitur permeatio, intumescunt rivuli qua parte fluere solent.*

From hence it is clear that He held that the blood did circulate continually, falling into the Heart by the *vena Cava*, and issuing out by the *Aorta* into all parts of the body: that this motion of the blood was perceivable by the *Ligatures* at any time, but most manifest in the intumescence of the veins in sleep: at what time also the blood or natural heat (which is all one to him) did pass by way of *Anastomosis* out of the arteries into the veins, as well as at other times. So that we are not to imagine any interrupted circulation in him, but that it did constantly flow night and day, sleeping and waking, though with unequal celerity. In letting of blood he tells us, that the blood which first issues out is venous, and blacker then that which follows, and comes more immediately out of the Arteries. — *Venas cum Arteriis adeo copulari osculis, ut vena secta primum exeat sanguis venalis nigrior, deinde succedat arterialis flavior, quod plerumque contingit.* And he explains the motion of the blood, and natural heat thus, to prevent all ambiguity. *At instabit quis in somno nequaquam prohiberi calorem in cerebro & sensoris: pulsant enim arterie in toto corpore etiam in somno. At presente calore innato debuisset duci in actum facultas animalis. An calor innatus in somno viget in venis & arteriis, non in nervis sine quibus, non sit sensus & motus? Extra igitur ferri est nervos petere, intra autem non solum ad viscera, sed in omnes venas & arterias; unde operationes naturales magis perficiuntur in toto corpore.*

I hope I have now determined the Question which hath occasioned so many heats in the world concerning the Circulation of the blood, who was the first Inventor of it? I have demonstrated that *Andreas Casalpinus*, a rigid Peripatetick upon sensible Experiments & Mechanical considerations, not notional apprehensions, did not only discover this motion of the blood

Qu. Med. l. 2.  
qu. 5. fol. 212.  
col. 1. lit. 6.

Qu. Med. l. 2.  
qu. 15. fol.  
230. col. 1.  
l. c.

(even through the Lungs) but gave it the name of *CIRCULATION SANGUINIS*; which name is not so proper in it self, considering the *Fabrick* of the veins and arteries, and the *Labyrinth* in which the blood moves universally, describing a Line no way circular, as that a man would have pitched upon it in any other Age then when *Casalpinus* lived, when the knowledge of the Learned Languages was less general then now, and such a barbarous stile in fashion, as our *Inventour* used. But it was not so in the days of *Dr. Harvey*, who published his Treatise in 4<sup>to</sup>. at *Francfort* in the year (as I take it) 1628. I must confess I am apt to think upon this consideration, that *Dr. Harvey* (who was a *Peripatetique* Physician, and in whose time at *Padoa*, those Physicians did flourish with the greatest repute of Learning and skill in Anatomy, as well as Philosophy) did take up this opinion from my Author. And although there wanted not occasion by reason of what *Walaus*, *Riolanus*, *Slegelius*, and others had said upon the point, for him to declare the original of the discovery, yet in his two Answers to *Riolanus*, and his Book of Generation, He no where asserts the Invention so to himself, as to deny that he had the intimation or notion from *Casalpinus*; but leaves the Controversy in the dark: which silence of his I take for a tacite Confession. His Ambition of Glory made him willing to be thought the Authour of a Paradox he had so illustrated, and brought upon the Stage, when it lay unregarded, and in all probability buried in oblivion. Yet such was his Modesty, as not to vindicate it to himself by telling a Lie. And such his Prudence, as rather to avoid the debate, then resolve it to his prejudice. Had *Dr. Harvey* been a Chymist, I should have guessed that he might have fixed upon the word Circulation, upon other reasons, and those congruous enough to his Hypotheses: but since (especially in the

days when he writ) those Studies were unknown to him, and not valued by him, I am inclined to think that He did receive his first Intelligence from this Professor at *Pisa* (where *Harvey* also was) and so improved those hints,

that

Narravit mihi. Nobiliss. & Ampliss. Nicolaus Oudart, illustrissimæ Principis Auriaci Consiliarius, meminisse se audire ipsum Harveium profitemem se revera primam circuitus sanguinis noticiam, & in eum sectione viventium inquirendi occasionem ex Herioto accepisse. Fuit is serenissimæ quondam Regis Jacobi gemmarum, & Ma-



that in the divulging of his *Opinion*, they are as little to be seen, as the first *indeclines* which *Painters* draw in *Pictures* that are *lost*, when the *Pourtrait* is finished: or as in the first *Appearances* of *Plants* above-ground, where those *leaves* and *buds*, which often give *growth* to the succeeding *stemme*, *flower*, and *fruit*, are *lost*, or altered so

as not to be known. Let it suffice, that *Dr. Harvey* had *parts* and *industry* enough to have *discovered* it, had he not been *prevented* therein. And I should have imagined that our *Countreyman* had found it out, without any communication with those other books (a thing possible enough, and of which we have instance in the case of *Rudbek*, *Bartholine*, and *Folice*) but that the reasons I have alledged render the case *suspicious*. Had *Casalpinus* writ a *distinct Treatise*, I doubt not but *much* of the *Glory* had been *his*: since there are as great differences between one *Circulator*, and another, and greater, then betwixt him and *Harvey*: but his notions being *confusedly* laid down *here* and *there* in his *Peripatetick* and *Medicinal Questions*, and he being not *ambitious* to pretend to any *new discoveries*, only to illustrate *Aristotles* tenets. I shall allow *Harvey* the possession of his present *repute*: nor do I give my self this trouble of collecting up into a *method* these *confused assertions* of *Casalpinus* out of any *envy* to the *dead*, but out of *animosity* to *Pretenders to Wit and Learning*, that *brave* it thus amongst us; yet if to be ignorant of *what hath passed in the world heretofore*, be an argument of *childishness*, there is not any thing more *puerile* then this sort of *Virtuosi*.

I might not dismiss my *Reader*, but that the great noise which this *Circulation of blood* makes in the *World*, enforceth me to speak a little more about the *utility* of this *discovery*, which our *Authour* describes to be the *most noble* of all those *discoveries* in the *Oeconomy* of *humane nature*, which *Wit and Industry* have made. I do confess I think the *Arguments* for it to be such as admit of no Answer in general;

theseos perius, eoqne nomine Londi ni celebris. Si verum hoc, verisimilius quoque est, vel ipsum, vel Sarpium, vel Heriotum, a Casalpio accepisse. Nemo enim mihi persuaserit, ab eorum nemine visum fuisse scriptum [venetiis impressum] quod vel titulo se, nedum eruditionis varietate atque sublimitate commendet. Jo. Artor. Vander Linden disput. de circuit. sangu. exercit. 9. sect. 196. & exercit. 16. sect. 182.

but when we come to debate how it passeth through the Lungs, (which Riolanus almost invincibly disproves) or through the Septum Cordis, (which Riolan and Bartholin asserts, but Harvey, Slegelius, Vander Linden, and others, reject it on good grounds) what it is that causeth the pulsation of the Heart? what continues on the motion of the blood in the veins, even when a Ligature is made betwixt the antecedent and subsequent blood. Whether the blood be diffused into the habit of the body, and reimbibed by capillary veins, or conveyed on by Anastomoses? whether there be any difference betwixt the venous and Arterious blood? How the Phenomena (which undeniably are observed) about the pulse can be made out; and particularly how some have lived without any Pulse, others (which I have known) in the palpitation of the Heart, suffer no change in their Pulse? How upon dissection or wounds sometimes both ends of the veine divided do bleed? How some bleed at the arme without any Ligature; some upon a double Ligature? These, and many other questions, when I come to dispute with my self, methinks I am forced to constrain my judgement in the assent I give to that Probleme: and what I am ashamed to deny, I finde I cannot own without some reluctancy, which is daily encreased in me by scruples arising from the Practick Part of Physick; nor do I blush to declare my self an Abettour only of such Tenets, as are consistent with, and illustrated by Practical Physick: it was thought at first that this Circulation of blood would overthrow all the usual Methods of Physick, and introduce new and beneficial discoveries in that part of Medicine which is Therapeutick. But Harvey denieth that it varieth the Medicine of the Ancients; and Slegelius asserts the same opinion, avowing it to be rather an happy illustration, then a subversion of the former praxi, though it alter the Theory much. In fine, those little advantages and Diorismes, which we derive from that Invention merit not our notice; nay, any man shall with more assurance bleed in many diseases in sundry manners and different places, upon diverse indications upon the old observations and rules, then on the new hypotheses, wherein as to the use of parts, and nature of humors, there

is



is as little of clearness and certainty; as there is efficacy in that practice, which is regulated most thereby.

I had forgot to take notice of the *vena lactea* ascribed to *Asellius*, the invention of them is thought a great discovery, and such as signatise a man in this Age. Yet even those vessels were known to *Galen*, as *Nardius* proveth out of his book against *Erastistratus*, c. 5. and out of the last chapter of his *Anatomical Administrations*. It is true, he calls them *Arteries*; he saith they were in the *Mesentery* filled with *Milk*, and that he observed them in young *Kids*. And *Hofman* in his *Variae Lectiones* doth produce out of *Galen*, de usu part. l. 4. sect. 19. a place so evidently shewing that *Galen* and *Herophilus* did recover those *Vena lactea*; that *Veslingius* cries out in a Letter to him, *Existimo aut nihil cum Herophilo Galenum vidisse, aut has 'Idias μεσεντερικὰ φλέβας, hos ipsos ductus esse, quos lacteos cum Asellio nominamus. Quae ad Pancreatis αδενώδη σώματα (ex multarum enim glandularum compage constructum videtur) pertinent.* The place in *Galen* is this, as *Hofman* represents it. *πρῶτον μὲν ὅτι πάντι τῷ μεσεντερικῷ φλέβα: ἐποίησεν ἰδίας, ἀνακεχυθῆναι αὐτῶν τῇ σπένει τῷ ἐντέρω, μὴ περικλυθῆναι εἰς τὸ ἥπαρ. Ὡς ὅτι αἱ Ἡρόφιλος. ἔλεγεν εἰς ἀδενώδη τινα σώματα τελευτῶσιν αὐτὰι αἱ φλέβες, τῶν ἄλλων ἀπάτων ὅτι τὰ πύλας περικλυθῶν. Which proof as it is perspicuous enough to ruine the discovery of the *Vena Lactea*, and the deducing of them unto the *Glandules* of the *Mesentery* (beyond which *Herophilus* and *Galen* did never trace the journey of the *Chyle*, but imagined those *veins* to nourish the *Mesentery*) so I think that the invention of the *Ductus Thoracicus* belongs to *Andr. Vesalius*, and *Barthol. Eustachius*: the one more obscurely proposeth it, the other more openly.*

*Andr. Vesalius de fabrica corporis humani l. 3. c. 7.*

p. 291. Edit. Venet. 1568.

— “*Aleo ut mihi etiam persuasum sit. quamvis id nunquam viderim; interdum a sinistro coeae caudicis latere, ubi jugulum contingit, venam depromi, quae secundum sinistrum vertebra- rum latus declivis ducta, sinistris costis samos offerat: illa quam sine pari nuncupamus, dexteris costis alente. Atque hujusmodi vena ortum, non tantum a jugulo primum posse fieri,*

P 3.

*Nardius.*  
noct Genial.  
4. p. 412.

Epist. xxi.

*C. Hofman*  
var lect. l. 2. c. 2.

*Jo. Ant. Van-*  
*der Lind n*  
*de circum-*  
*fangn. xerc. 9*

“sed paulo infernis, etiam agnus attestatur: in quo tale aliquid  
“semel observavi.

“Viden’ venisse in rem, & quasi in manu jam <sup>h</sup>abuisse il-  
“lud Ariadnæ filum, quod secutus penetrare in naturæ La-  
“byrinthum, majoremque sibi gloriam comparare potuif-  
“set? sed quo fructu? Audi sis, & discce, quam homini, sci-  
“entias sectanti, necessarium sit, etiam in naturalibus eum,  
“qui sui juris & muneris fecit, docere homines scientias &  
“artes, Ps. 94. v. 10. Jer. 28. v. 26, precari, Revela oculos  
“meos ut cernam mirabilia in operibus tuis, ex Ps. 119. v. 18.

“Verum, inquit, ejusmodi non nisi rarissime occurrentes ve-  
“narum series, anatomes studioso non aliter expendendas pu-  
“tarim, quam si interdum sextus in manu digitus, aliud ne mon-  
“struosum se spectandum offerret. Adeo ut si quando in publicis  
“sectionibus hæc observo, ea tanquam non essent, tacite prater-  
“eamne artis candidati in omnibus corporibus hæc observari ar-  
“bitrentur.

“Quanto egregius, & propter hoc non unam atque im-  
“mortalem laudem meritis Barth. Eustachius: qui non so-  
“lum candide exponit, quod vidit; sed et præmissis, quod res  
“merebatur, præloquio conatus est posteriorem studia ex-  
“citare ad ulterius rem inquisitionem et perfectiorem cogni-  
“tionem. Neque enim ignorabat, rei quidem inventionem, &  
“εὐτυχίας munus esse: at vero ejus plenam cognitionem τῆς  
“εὐτυχίας opus esse. Sed audiamus ipsum.

“Ad hanc naturæ providentiam quandam equorum venam a-  
“lias pertinere credidi: quæ cum artificii & admirationis plena  
“sit, nec delectatione ac fructu careat: quamvis minime sit ad  
“Thoracem alendum instituta: opera pretium est ut exponetur.  
“Itaq; in illis animantibus, pergit ab hoc ipso insigni trunco sini-  
“stri juguli, quæ posterior sedes radicis vena interna jugularis  
“spectat, magna quædam propago rminat: quæ præterquam  
“quod in ejus origine ostiolum semi-circulare habet, est etiam  
“ALBA ET AQUEI HUMORIS PLENA; nec longe ab  
“ortu in duas partes scinditur; paulo post rursus coeuntes in u-  
“nam: quæ nullos ramos diffundens, juxta sinistrum vertebra-  
“rum latus penetrato septo transverso, deorsum ad medium usq;  
“lumborum fertur: quo latior efferta, magnamq; arteriam cir-  
“cumplexa, obscurissimum firem, nihilq; adhuc bene perce-  
“ptum, obtinet.

Since



Since the writing hereof, I have met with a book containing certain Letters of *Marcellus Malpighius*, and *Carolus Fracassatus*; in which it is observable that *Fracassatus* (the *Anatomy-Professor at Pisa*) doth ascribe the *Invention* of the *Circulation of the blood* to *Casalpinus*; and of the *ductus Thoracicus* to *Eustachius*: His words are these: "*Adeo oscitantia Autorum quaedam tam male preponuntur, ac tanguntur, ut oporteat alios eadem repetere, ac ditare novis elucubrationibus, ac si nunquam fuissent. Sanguinis Circulatio, Galaxia in Microcosmo humano, scilicet via Chyli Cor, nonne Casalpinum agnoscit Authorem, ac Eustachium de vena sine pari? Et tamen soles in Scholis Autores crepant Anglos Harvæus, & Dispenſes Pecquetos: non tamen spernendi, qui verum rudimenta ponunt, etiam si infecto nec absoluto opere cessaverint: qui invenit anticipavit laborem & curam querendi: & ad minora vocatur, si quaestionis sollicitudo & jactatio tollatur: par tamen decus manet & illum, qui primum invenit, & qui postremum perfecit, nescio enim an præstet invenisse, an ditasse.*"

*Fracassatus  
de cerebro,  
p. 202.*

Having said thus much, I leave Mr. *Glanvill*, to answer those little *quiblets* of his, which can convince none but *Shallow-brain'd* and *Comical Wits*. — "If they knew these grand Theories formerly; how chanceth it that they speak no more of things, which no doubt they had frequent occasions to mention? How come they to be left without memory among their followers, who were such *superstitious porers* upon their writings? How chanceth it not to have been shewn to be lodged in those Authors before the days of Dr. *Harvey*, &c. when Envy had impregnated and determined their imaginations? Let illiterate persons and Mathematicians be swayed against plain-proof by these Arguments. I think in stead of Temples and Altars to be erected to these Inventors, there is more need of a *Schoolmaster* and an *Antiquary*, the one to teach them humane learning, the other to instruct them in past discoveries; least, with much trouble and pains our new Philosophers should finde out again the *Art of Printing*, or *Etching*: the use of *Gunpowder*, or the *Load-stone*.

## Of Transfusion of Blood into Animals.

Plus Ultra.  
Pag. 17.

“ **T**Hus, Sir, I have done with Instances of Anatomical  
“ Advancements, unless I should hitherto referre the  
“ late noble Experiment of Transfusion of the Blood,  
“ from one living Animal into another, which I think very fit to  
“ be mentioned; and I suppose it is not improper for this place:  
“ Or however, I shall rather venture the danger of impropriety  
“ and misplacing, then omit the taking notice of so excellent  
“ a Discovery, which no doubt future Ingenuity and Practice  
“ will improve to Purposes not yet thought of; and we have very  
“ great likelihood of advantages from it in present Pro-  
“ spect.

“ For it is concluded, That the greatest part of our diseases,  
“ arise either from the scarcity, or malignant tempers and  
“ corruptions of our Blood; in which cases Transfusion is an  
“ obvious Remedy; and in the way of this Operation the pec-  
“ cant blood may be drawn out, without the danger of too much  
“ enfeebling Nature, which is the grand inconvenience of meer  
“ Phlebotomies. So that this Experiment may be of excel-  
“ lent use, when Custom and Acquaintance have hardned men  
“ to permit the Practice in Pleurisies, Cancers, Leprosies,  
“ Madness, Ulcers, Small-Pox, Dotage, and all such like  
“ Distempers. And I know not why that of injecting prepared  
“ Medicines immediately into the blood, may not be better and  
“ more efficacious then the ordinary course of Practice: Since  
“ this will prevent all the danger of frustration from the loath-  
“ ings of the Stomach, and the disabling, clogging mixtures  
“ and alterations they meet with there, and in the intestines, in  
“ which no doubt much of the spirit and virtue is lost. But in  
“ the way of immediate injection they are kept intire, all those  
“ inconveniences are avoided, and the Operation is like to  
“ be more speedy and successful. Both these noble Experi-  
“ ments are the late Inventions of the ROYAL SOCIETY,

ohw



"who have attested the reality of the former, that of Transfusion  
 "of Blood by numerous trials on several sorts of brute Ani-  
 "mals, Indeed the French made the Experiment first upon  
 "humane Bodies, of which we have a good account from Moun-  
 "sieur Dennis. But it hath been practised also with fair  
 "and encouraging success by our Philosophical Society. The  
 "other of injection, if it may be mentioned as a different in-  
 "vention, was also the Product of some generous Inventors ;  
 "though indeed more forward Forreigners have endeavoured  
 "to usurp the Credit of both. This latter likewise hath suc-  
 "ceeded to considerable good effects in some new Trials that  
 "have been made of it in Dantzick, as appears in a Letter  
 "written from Dr. Fabricius of that City, and Printed in the  
 "Philosophical Translations.

I shall not quarrel with Mr. Glanvill for misplacing this discourse about the Transfusion of Blood, but I think all the World will condemn him for ascribing either the invention of Transfusing blood, or of injecting Medicaments into the veins, unto the Society. That the latter was a thing much practised by Dr. Wren and others in Oxford, before the Restoration of his Majesty, and before that ever the SOCIETY was thought upon, is a thing known to all that were at those days in that University. I saw my self in those days the Dog into whose veins there was injected a Solution of Opium, at the Lodgings of the Honourable Robert Boyle, of which he makes mention in his second discourse of the Usefulness of Natural Philosophy, and Borrichius in his Letters to Bartholinus.

As for that other of Transfusing the blood out of one Animal into another, if the Question be who first proposed it into the World to be tried, it is certain that Libavius first did that, at least I know not any more ancient then He. That Learned man above Fifty years ago, so plainly describes the Transfusion, that one can hardly discourse of it with more clearness, then there is done in these words. *Adsit Juvenis robustus, sanguis, sanguine spirituosus plenus: Adstet exhaustus viribus, tenuis, macilentus, vix animam trahens. Magister Artis habeat tubulos argenteos inter se congruentes, aperiat arteriam robusti & tubulum*

Those For-  
 eigners will  
 rectifie here-  
 after their  
 mistakes, and  
 not attribute  
 the injecting  
 of Medica-  
 ments to their  
 invention: as  
 Gaspar Schot-  
 tus in Mirab.  
 Art. l. xi. c.  
 et. p. 891. &  
 Phil. Jac.  
 Sacks in O-  
 cean Micro-  
 microcosm.  
 f. 155. have  
 done, unjust-  
 ly magnify-  
 ing solertif-  
 gram Indu-  
 striam & Ex-  
 perientiam of  
 these Preten-  
 ders  
 Andr. Libav.  
 A. 1615. Syr-  
 g. m. arca-  
 no. adv. Hen-  
 ning Scheu-  
 nemem act 2.  
 c. 1. pag. 8. c.  
 d. t. Franco-  
 furt. A. 1615.

*tubulum inferat, muniatque mox & agroti arteriam findat, & tubulum fœmineum infigat: jam duos tubulos sibi mutuo applicet, & ex sano sanguis arterialis calens & spirituosus saliet in agrotum, unaque vite fontem afferet, omnemque languorem pellet.* This allegation was made use of by an Italian Philosopher, and silenceth all those in England, or France, that pretend to the Glory of having first proposed: So that the Author of the *Philosophical Transactions* confesseth it in these words". This indeed is clear enough, and obligeth us to averre a greater Antiquity of this operation, then before we were aware of, though 'tis true, *Libavius* did not propose it, but only to mock at it (which is the common fate of new Inventions in their Cradle) besides that, He contrives it with great danger both to the Recipient and Emittent, by proposing to open Arteries in both, which indeed may be practised upon Brutes, but ought by no means upon Man. Till that learned Italian had instructed the *Virtuosi* in the point, there had been a great Controversie agitated between the French and English Societies about the Invention. The former pretended, that it was mentioned first amongst them about eleven years ago, at the Assembly, in the house of *Monsieur de Montmor*, and that the publick is beholding to that Monsieur for this discovery, and the benefits and advantages that shall be reaped thereby. But about the person that should first mention the design, the French vary. *Monsieur de Gury* fathers it upon the Abbot *Bourdelot*: but the Author of their Journals upon a *Benedictine* Friar. Our Society having given the world occasion to take notice of it publickely, and having otherwise long before pursued the Oxford-Invention of injecting Liquors into the veins, thought themselves injured in this, that the French should usurp the Credit of such a discovery as had its first birth in England, upon a pretence that it was conceived in France: it being notorious, the French took occasion to try it by the Example of the English *Virtuosi*: and there being no publick record cited, declaring the time and place of the Invention proposed the Method to practise it. and the success of the Execution. Thereupon began a Paper-scuffle betwixt the *Gazettiers* of the

Phil. & Transf.  
act. Numb. 37.  
p. 740.

Ly his leave  
it infers only  
the mention  
of it to be  
more ancient,  
not the Ope-  
ration.

*Libavius* pro-  
poseth it out  
of some Para-  
cellian Magi-  
cal Writer,  
and not  
from his own  
Fancy: ad-  
ding that the  
Physician  
who practi-  
seth is Trans-  
fusum, delects  
Hellebore  
himself.

See Mr. J.  
Denny's Let-  
ter in the  
Transact.  
Numb. 27.  
ib. num. 28.



the *Curienſe* which any man may read with ſome pleaſure, becauſe they had on both ſides ſuch little *Logick*, as to argue from the mentioning of a *deſign*, to the effecting it. If the way of *Argumentation* be good and ſolid, then *Ariſtotle*, and ſuch of the *Ancients*, as propoſed the ſquaring of the Circle, muſt not be denied the glory of being *Inventors* of it: So they which firſt propoſed a *perpetual motion*, or the *North-weſt Paſſage*, may go for *Inventors* of them: yet are none of theſe things yet diſcovered. Oh! new *Correlates*, and worthy of our *Inventors*! Long ago *Ariſtotle* and the *Common Dialecticks* told us, *Datur ſcibile de quo non datur Scientia*. But none like our *Anti-Logicians*-ever taught, there were a ſort of *Inventors* whoſe *Inventions* were yet to ſeek. All that our *Inventors* did, was, that after *Dr. Lower* had firſt diſcovered and practiſed the *Transfuſion* at *Oxford* in *February 1665*. They on the ſeventeenth of *May* following 1665. gave order that there ſhould be trials made for tranſfuſing the blood: but their trials proving lame for want of a fit *Apparatus*, and a well continued *Method of Operation*: the *Dr.* ſent them a convenient *Method* for effecting the thing. Before this, there never was any mention or propoſal made at the *Society* concerning the *Transfuſion*, as I am certainly informed by one of their *Number*, who hath examined their *Journal Books*, in which ſuch *Propoſals* and *Experiments* are recorded. Nay, they were ſo far from pretending to it at firſt, that when it was mentioned unto them by *Mr. Boyle*, there were ſome as well ſevere as ingenuous *Criticks*, who thought it ſomewhat ſtrange and bold for him to affirm that the *Dr.* had made it ſucceed. And beſides, I obſerve that *Mr. Boyle* in his *Letter* to *Dr. Lower* (who hath vindicated the *Invention* to himſelf in his late Book *de Corde*) doth not ſay that ever the *Society* had thought of or attempted, or deſigned to attempt the thing. He calls it *inſolitum & inſperatum conamen*. *June 26. 1666.* and deſires He would acquaint the *Society* with the manner how he atchieved it. Now ſince that neither was *Dr. Lower* then of the *Society*, nor any way entitles them unto it, but himſelf, and that in a *Treatiſe* wherein he doth not ſo much as call him-

See Transact.  
Num. 28.  
pag. 524.

In the Transactions numb. 37. pag. 371. The Gazettier affirms, that upon further investigation it was by good proof (which is in his hands) proved, that the invention had been known to some ingenious persons in England thirty years ago. If so, then is not the Society the Inventors of it, except we will say, that Societies as well as individual souls do pre-exist? But may not a man ask our Gazettier, where is the publick record of this Invention? what Account is there of the Method with which it was practised? with what success? How comes all this to be concealed till after Dr. Lower achieves it, and the French pretend to it? would any man have concealed their claim to the Discovery, after that it was become the talk of Europe, the Darling of the Society, and worthy to be disputed for by the French? why did they not put in their Claim, being within hearing, till about three years after,

self a Member of that Assembly, let any man judge with how much truth this other Discovery is ascribed to these **NEW EXPERIMENTATORS**, by our Virtuoso. But least I should seem to deal too severely and maliciously with them, rather then it shall be said That they invented nothing, I grant, that They invented a **LTE**; and shall conclude the Debate by representing the words out of their Transactions, by which they assume to themselves the Credit of the Invention, and by a dubious wording and pointing of the Period, insinuate as if Dr. Lower as well as Dr. King had been encouraged to the Attempt by the Society.

*Philosoph. Transact. Numb. 27. pag. 490.*

“How long soever that Experiment may have been conceived in other parts (which is needless to contest) it is notorious that it had its Birth first of all in England; some ingenious persons of the Royal Society, having first started it there, several years ago, (as appears by their Journal) and that detrous Anatomist, Dr. Lower, reduced it into practice, both by contriving a Method for the Operation, and by successfully executing the same, wherein he was soon overtaken by several happy Trials of the skilful hand of Dr. Edmund King, and others encouraged thereunto, by the said Society, which being notified to the World Numb. 6. 19. & 20. of these Transactions printed Novemb. 19. & Decemb. 17. 1666. the Experiment was soon after that time heard of to have been tried in forreign Parts, without hearing any thing of its having been conceived ten years ago.

In which relation, I must take notice that it doth not really appear in their Journal-books, that ever any such thing was started by any persons how ingenious soever of their Society; Dr. Lower being not then, nor long after in the History of the Royal Society reckoned as a Member of it. Next  
tha



that the *interpunction* of the period is so *equivocally* placed and penned, that the *unwary Reader* may think that Dr. Lower, as well as the *others* was encouraged to the *trial* by the *Society*. Whereas he was not, whatever the *others* were. Again, it is *disingeniously* said, that he was soon overtaken by *several happy Trials* of Dr. Edmund King, and others, encouraged thereto by the *Society*. Since it appears by the letter of Mr. Boyle, that the *Society* knew not how to do the thing in *June*, which Dr. Lower had effected in *February*, and the fame thereof at that time was spread over *England*. In *July* Dr. Lower acquainted the *Society* with the *manner of the Transfusion*, whereof Dr. Wallis had given the *Society* an imperfect account a little before of what he had seen Dr. Lower do at *Oxford*. So that for at least four or five months, the *Members* of the *Society* did not overtake Dr. Lower. But after they were acquainted with the contrivance, they invented it very clearly.

From hence it is easie for any man to judge with how much right Mr. Glanvill doth say, that both the *injecting of Medicines*, and *transfusing blood into the veins of Animals*, those *Noble Experiments* were the *late Inventions of the SOCIETY*. I shall now proceed to inquire into the *Utility of them*; thereby to discover how *noble and excellent* they are, and what *advantages* we may hope to derive from them hereafter.

Because this *Transfunding of blood* hath hitherto been looked on as the *primary Invention*, and the most famed of any the *Society* were ever intitled unto: and that they themselves have particularly concerned themselves in asserting it to be their *discovery*, to the end that every *Reader* may the better be able to judge of the *Controversie*, without being forced to go seek out amongst the scattered *transactions* and elsewhere, several *Histories* that are material to the passing a right judgement; I shall crave pardon if I do relate particularly the matter of *fact*; and what hath been sundry times performed by the *English, Italian and French Virtuosi*, with every circumstance, both as to *injecting of Medicines*, and of *blood into the veins*.

As to the *injecting of Medicaments into the veins*, it is an *Experiment* that I am apt to think was first tried by the *English*, and as a *curiosity*, it was not *unpleasant*; but that it should be so advantageous a discovery as *Mr. Glanvill* represents it is like to be, I do not believe. There was a time when men had regard to their *Consciences*, and what could not be administered but upon *prudential hopes* of advantage to the *Patient*, no approved *Physician* durst, or would give to any sick person: but in this *Age*, such as ought to protest against it, are as forward as any to forget these considerations, and prompt men on to practices without either regarding whether the effect be not *Murder* in the *Physicians*, besides the ill consequences to the *diseased*. In the *injecting of Medicaments*, I must complain that neither the *Operation of Medicaments immediately injected into the blood and veins* is known, nor the *dose*; and consequently the *Project* not like to improve *Physick* at all, unless our *Magistrates* will licence men to try so many *Experiments*, even to the apparent hazard or certain death of the parties, and may regulate and authenticate the practice in such manner as becomes a *Baconical Experiment*: and to encourage Rational men to this procedure, there ought to be a greater deficiency in *Physick*, then yet appears, and a more *hopeful success* then any man can yet expect, supposed by this way. A *Paynim* told us,

*Nulla unquam de morte hominis cunctatio longa est.*

A sober *Physician* will look upon the act to be as indiscreet, as the *Comedian* describes love to be, *Quares in se neque consilium, neque modum habet ullum, eam consilio regere non potes*. That there is no probability that this way of *Medicine* can ever amount to any thing, appears from this consideration, that *Liquors immediately injected into the blood*, have a different *Operation* there, then when taken in by the *Stomach*: and that the mixtures of *Liquors with blood* upon *Phlebotomy* in a *Pottinger*, gives no light to the *Experiment*. As I shall now shew.

*Seignior Fracassati* Professor of *Anatomy* at *Pisa* tried these



these Experiments by injecting Medicaments.

1. Having injected into the jugular and crural veins of a Dog some *Aqua fortis* diluted, the Animal died presently: and being opened, all the blood in the vessels was coagulated and fixed: but that which was in the Viscera (which I dare not English Guts, but take it to denote the Heart, Liver, Lungs, Spleen, where the blood passes extravasated through: though the Transactions render it Guts, and destroy the antithesis betwixt *vasa* and *viscera*) did not so easily coagulate. It was also observed that the great vessels were burst, or as it were cut asunder, yet have I known who hath put *Aqua fortis* into cooling Juleps in Fevers, as others do Spirit of Vitriol without any harm.

Transact.  
num. 27. p.  
490 491.  
Car. Fracaf.  
fac. Ep. Anat.  
de cerebro.  
p. 252. 253.  
54.

2. There was also infused into another Dog, some spirit of Vitriol, which had not so present an effect: for the Animal complained a great while, and foamed like *Epilepticks*, and had its respiration very thick: and observing the beating of his breast, one might easily judge, the Dog suffered much: who dying at last, his blood was found fixed in the veins, and grumous, resembling Soot: whereas in the Experiment with *Aqua fortis* (which may as easily be given inwardly as spirit of Nitre) the blood is not said to have been changed in its colour from other coagulated blood. It was also observable (though the Transactions minde it not) that the blood in this last Dog was not upon coagulation continuous in the veins, but broken and severed into parcels.

3. There was also injected into the jugular of another dog, some oyle of Sulphur *per campanam*, but he died not of it, though this infusion was several times tried on him. And the wound being closed, and the dog let go, he went into all the corners of the room, searching for meat, and having found some bones, he fell to gnawing them with a strange avidity, as if this Liqueur had caused in him a great appetite.

4. Another dog, into whose veins some Oyle of Tartar *per deliquium* was injected, did not escape so well: for he complained much, and was altogether sweln; and then died: Being opened, the Spectators were surprised to finde his

blood

blood not curdled, but on the contrary more *thin* and *florid* then ordinary.

Dr. Lower  
de motu Cor-  
dis pag. 119.

Transact.  
num. 27. pag.  
49.

5. Dr. Lower having extracted half a pound of blood out of the *crural urine* of a *Mastiff dog*, did inject the like quantity of warm *milk* into him; within half an hour the *dog* became very *sick*, breathed with difficulty, and seemed to labour much with his *heart* and *diaphragme*, and after to palpitate, tremble and sigh grievously, and at length miserably died. Upon dissection he found the *vena cava*, the ventricles of the *heart*, the vessels of the *Lungs*, and the *Aorta* full of *blood* and *milk* coagulated together, and the *concretion* was so hard, that it was not easie to part it. This he tried but once. But *Monsieur Dennys* the *French Physician* saith, he tried it with a different success. For having syringed about a quarter of a pint of *milk* into the *veins* of an *Animal* (he tells not *what*) and having opened the same some time after, he found the *milk* so perfectly mixed with the blood, that there was not any place in which appeared the least footstep of the *whiteness* of the *milk*, and all the blood was generally more *liquid*, and less apt to *coagulate*.

Mr. Boyle of  
the Usefulness  
of Nat. Phi-  
los. part. 2. p.  
54, 55.

Vid. supra.  
P. 53, 54.

6. I received an account of some Experiments, from one much versed in these *injections* (which he may one day acquaint the world with) to this effect. That the infusion of *Crocus Metallorum*, injected in a less quantity then otherwise (*viz*,  $\frac{1}{3}$ ) will work by vomit in a *dog*, almost presently, and very strangely, and make him grievously sick. Yet Dr. *Wren* informs Mr. Boyle, that a moderate dose of the infusion of *Crocus Metallorum* did not much move the *dog* that he injected it into: but a large dose of *two ounces* or more wrought soon, and so violently, that he vomited up life and all. That a *dog* will take two drams of *Opium* into his *Stomack*, and seem never the worse, if you keep him from lying down half an hour after; but *two drams* of *Poppy-seeds* made into an *Emulsion*, and injected into his *veins*, will kill him presently.

7. Mr. Boyle saith, that he conveyed a small dose of the tincture of *Opium* into a *dog* this way, which began to work so speedily upon the *brain*, that he was scarce untied before the



the *Opium* began to disclose its *Narcotick* quality; and almost as soon as he was upon his feet, he began to *nod with his head*, and reel and falter in his place; but being kept *awake*, and in motion, by whipping up and down the *Garden*, after some time he came to himself again, and not only recovered but began to grow fat so manifestly, that 'twas admired.

8. A certain *German Count* coming into *England*, relates an Experiment, which he saw in the presence of *Pr. Rupert*. After some *blood* taken from a *dog*, there was injected into him a small quantity (*portiuuncula*) of *Spanish wine*; within sometime after the *dog* was perfectly *drunk*, being giddy, performing sundry ridiculous actions, then *vomiting* with a profound sleep.

Phil. Jac.  
Tracts in O-  
cean. macro-  
microcosm.  
lib. 155.

9 *Dr. Fabricius* Physician to the City of *Dantzick* injected purgatives into *humane bodies*, with this effect. A strong bodied *Souldier* being dangerously infected with the *Pox*, and having grievous protuberations of the bones in his *armes*, two drams of a *purgative liquor* were injected: he presently complained of great pains in his *elbows*, and the little *valves* of his arm did swell so visibly, that it was necessary by a *great compression* on's fingers to stroke up that swelling towards the *Patients* shoulders. Some four hours after it began to work, not very troublesomely; and so it did the next day, in so much that the man had five good stools with it. Without any other remedies those protuberances were gone, nor are there any footsteps of the disease left. Two other trials were made upon women, the one a *married woman* of 35, the other a *Servant-maid* of 20 years old: both from the birth had been grievously troubled with *Epileptick Fits*, so that there was little hopes of curing them. There was injected into *their veins* a *laxative rosin*, dissolved in an *Antiepileptical spirit*; the first of these had gentle stools, some hours after the *injection*; and the next day the *Fits* recurred now and then, but much milder; and are since quite vanished. The *Maid*, she went the same day to stool four times, and several times the next: but by going into the *Air*, and taking cold, and not observing any diet, cast her self away. 'Tis remarkable, that it was common to all three, to vomit soon after the *injection*, and that *extreamly*, and frequently.

Transact.  
numb. 30. pag.  
564, 565.

I have

I have not time to adde any more of these kind of *trials*: but from hence it is evident, that things *operate* (where they do operate in the same manner) in a lesser *dose*, then when

taken into the *Stomach*: and with more *violence*. - That oftentimes such things as are *innocently* taken into the *Stomach*, are mortal when *injected immediately into the blood*. That although learned Physicians have made *little or no difference* betwixt the operation of *Oyle of Sulphur*, and that of *Vitriol*, yet by this *Experiment* there is found to be a quite different effect. So the *Salt of Tartar* (which is as innocent as

*Vulgo haec Genus a non paucis spiritus Vitrioli, & Sulphuris pro diversis rebus habiti sunt: adeo quidem ut nonnulli flores sulphuris, & acidum ad eos semipulmonis morbos exhiberent: sed valde imperite cum acidum omnia sint rectori inimica, & spiritus Sulphuris & Vitrioli essentia nulli modo differant, sed ex eadem re generentur, & parentur. Et enim spiritus Vitrioli & Sulphuris eundem saporem, colorem, & omnino easdem qualitates & effectus habent, & ad eundem usum in medicina adhibentur: nondumque inventus est, qui peculiarem aliquam, seu manifestam seu occultam qualitatem in spiritu Sulphuris monstrare poterit, quae non eadem in spiritu Vitrioli sit. Sennert. in Paralipomen. ad institut. l. 5. part. 3. sect. 3. c. 5.*

*Salt of Wormwood*, or any such *Salt*) had a pernicious effect upon the *dog*, though *discrepant* from the others.

As to the *Experiments* of Dr. *Fabritius*, they do not give much of *Encouragement* to the *Trial*, for the one died which had the most of *youth*; and though her death be attributed to other circumstances and neglects, yet either those are *trivial*, or for some (*unknown*) length of time there must be greater care then ordinarily after *Physick*, otherwise *small accidents* become mortal. And the *extreme* and frequent *vomitings* (which here happen from the sufferings of the *Heart*, and not the *Stomack*) render the course more *hazardous* to *tender Stomachs*, and *weak Constitutions*, then Mr. *Glanvill* suggests. So that the *loathings of the Stomack* are not prevented by *this way*, nor the success very *inviting* (how speedy soever) upon those *Experiments* any more then from the *Churlish Physick* of the ancient and moderate *Chymists*. of Mr. *Odores*'s party, which *wise-men* will not imitate. I wonder the *laxative Solutions* were not set down that we might judge of their *strength*: and that the way of dieting and ordering of them afterwards was omitted: whereas the knowledge thereof might avail to prevent the *ill consequence* which befel the *Maid*.

I shall now consider the effects which the *several Liquors* have



have upon a mixture with the blood, when taken warm in a Pottinger, and those affused to it. This is a Practice which the Honourable Mr. Robert Boyle imparted to the Royal Society in December 1664. and thinks that *Fracassati* may have taken his hint from it, to inject those Liquors: but I finde a Letter from Leyden sent to Bartholinus, Dated Jan. 9. 1662. in which there are several Experiments of that kind, which I shall set down presently. If I placed any great value upon the Experiment, I could put in for the Practiser of it at Stratford upon Avon in 1660. and prove that I made some Solutions of Salt of Ash, Salt of Wormwood, and Salt of Tartar, and received the blood of sheep into the glasses in which they were, to try the differences betwixt those Salts, whether they were of the same nature (so that it was indifferent whether one used Salt of Wormwood, *Carduus Benedictus*, Tarrow, or Mugwort) or that there were any difference. Which last *Angela Sala* denies, though other Chymists affirm it. But after that I had enquired into that Controversie by several ways, I went to Jamaica and neglected the Experiment. But since that I see that every unprofitable trifle, becomes a famous and noble Experiment, and if it bring no present Emolument, yet at least it becomes Luciferous, and (as they say) puts us in the Prospect of several great advantages; at least, more and greater things will be disclosed by it, when future ingenuity and diligence hath improved and perfected the invention. Since that time I have made many Essays about the mixture of sundry Liquors, with the blood of Sheep, Lambs, Calves, Cows, Oxen, Hogs, Poultry, and that in several manners.

I have received the blood of several creatures upon warm solutions of sundry Salts, of Allom, impure Salt-peter, *Sal Prunella*, Salt of Nitre, upon solution of the several Vitriols; upon Steel-wine, Vomitive wine, Sack, French wine, and Malaga, upon spirit of wine, spirit of Cider, and spirit of the grounds of Beer; upon warm Urine, upon mixtures with spirit of Vitriol, and oyl of Sulphur, and Juice of Lemons, and Oranges, upon the rare liquor of Salt-peter; upon it, after it hath passed the Ashes, and upon the Mothers of it, and many other trials with oyle of Wormwood, Amber, &c. dissolved in spirit of wine.

R

I have

*Angela Sala*  
Tartaralog.  
sect. 3 c. 2 p.  
133.

I have also poured upon the *Mass*, after it hath coagulated several *acid spirits*, before and after the *Serum* was separated from it.

I have also taken the separated *Serum*, and affused *spirit of Vitriol* to some; to others *spirits of Harts-horn*, and other *spirituous waters*, and I have affused to those that had a mixture of the *spirit of Harts-horn* some *acid spirits*, and other *liquors* to see the *changes*.

I shall not now set down the several *Phanomena*, and observations I made, not having leisure to digest them all, nor being willing to dismember a discourse I intend about the nature of *blood* and *Phlebotomy*, in which I shall not only treat of all these things, but adde many other observations, from the *burning of blood*, and the *Serum*, which any man may do, without feeling any thing by *sympathy*, notwithstanding the *whimsies* of *Helmont*, and that great *Virtuoso* Sir *Kenelme Digby*. I have done it fourty times in *Men*, *Women*, and *Children*, to observe those varieties in *blood*, which never entred into the heads of our *Experimentators*. Though *Dr. Walter Needham*, my learned *School-fellow*, a Member of the *Society*, deny that *blood* will burn, *Carbonibus injectus sanguis flammam non facile concipit, sed potius torretur in grumum*. Yet if any one please but to take a piece of the coagulated *Mass* of *blood*, and lay it on a *Fire shovell*, and so place it in an hot fire, that the *coales* arch round about it, but touch it not: after he hath observed the great variety of its *intumescence*, and the *crackling* of *divers salts*, as it were *decrepitating*, it will take flame commonly when dry, and burn with a great variety of *Phanomena*: some will not flame at all, though brought to *ignition*: there will be also variety in the remaining *Ginis*, as to its *saltness*. In the like manner set the *Serum* to coagulate on the *coals*, and then burn it. I have also burned the *blood* and *Serum*, after it hath been mixed with *acid liquors*. By this trial will appear more then can be imagined as to the differences of the *blood* of *Animals*, and of young and old *Animals*, I will endeavour to finish that *Tractate*, wherein there will be observations about the colour of *blood*, and *mélancholique*, and

*pituitous*,

Disquisit. de  
sœtu. pag. 130.



*pituitous, and crimson parts; and a certain pellicle which generates by the Air on the top of most blood, if it stand 24-houres; which sometimes is as firme as those tunics that encompass the Liver, or Kidneys. Observations upon that, and upon the turning of the coagulated Mass, and its becoming red again, though not so floridly. Trials upon that in vessels cover'd, that it is not from the air, in opposition to the Fracassati.*

I will not mention any thing hereof now, but having imparted some observations to some, and knowing what plagiaries some men are, I thought fitting to publish *thus much*, that they might not pretend to the inventions, each whereof were enough to make one of them proud, and fill the Transactions. Yet I will say this, That I never had put my self upon these trials, but out of envy and indignation against them, and the Transfusion of blood, about which they made such ado every where. I shall promise one thing, that Mr. Boyle is very much mistaken in, imagining that there is a great difference betwixt the effects of Medicaments, when mixed with the warm blood of an Animal out of the veins and in them, as will appear by the mixture of milk already specified, and that of the Salt of Tartar, which will follow out of the Letter of Borrichius.

Experiments upon the mixture of Liquors, with the warm blood of Animals, taken out by Phlebotomy.

1. By putting into the warm blood, as it came from Animals, a little *Aqua fortis*, or Oyle of Vitriol, or spirit of Salt, (these being the most usual and acid menstruums) Mr. Boyle observed, that the blood not only would presently lose its pure colour, and become of a dirty one, but in a trice also be coagulated; whereas some, if fine urinous spirit, such as the spirit of Sal Armoniack, were mingled with the warm blood, it would not only not curdle it, or imbase its colour, but make it look rather more florid then before, and both keep it fluid, and preserve it from putrefaction for a long time.

Transact.  
numb. 29. p.  
552.

Tho. Bartho-  
lin. ep. Cen-  
tur. 3 ep. 97.  
pag. 421, 4. 2

2. The Learned and Inquisitive Man Olaus Borrichius, having cut up a dog alive, made these observations. He took five glasses, and placed them in order, putting into the one spirit of vinegar, into another oyl of Tartar per deliquium, into a third a Solution of Allom, into a fourth spirit of Salt Armoniack, into a fifth spirit of wine; into each of the Glasses, he suffered the blood of the Crural Artery to run. After some time he come to look upon his Glasses, but the next day the observation was most perspicuous. That Glass

which had the spirit of vinegar in it, it was become black like to the blood of Melancholique persons, with a thick and copious black sediment, and that liquor which was on the top, was blackish.

Where the Oyl of Tartar was, the colour was pretty florid, but the liquor more turbid; no sediment at all, only some filements, like little fibres floated in it conspicuously, here and there.

Where the Solution of Allom was, there all seemed like a subcineritious or dirty coloured putrilage, there being no reliques of the crimson colour of blood to be seen.

Where the spirit of wine was, there the liquor was more turbid then that which had the Oyl of Tartar in it.

Where the spirit of salt Armoniack was, that was of the most beautiful colour of all, being very florid, of a thin consistence, with a diaphanous sediment like to the gelly of currants.

This observation he also tells Bartholinus, that he had in like manner made the preceding Summer.

Out of all which it most evidently appears how nice a thing the blood is, and how small mixtures alter the colour and texture of it: and what consequences may follow upon such alteration of its consistence, and particular texture, no man knows; but that they may be very bad (even where innocent, and wholesom Medicaments are affused) is evident out of what I have set down.

It

Inspeximus post intervallum & plenius postulante omnia: Observavimus sanguinem, cui effusus erat spiritus aceri, redditum nigricantem instar sanguinis Melancholicorum, sedimento crasso, copioso, atro, si pernatantem liquorem, pene etiam atrum. Cui effusum oleum salis tartari, redditum coloris sic fatis floridi, sed turbidiorum liquorem, sedimentum nullum, ramenta tantum fibrillarum instar hinc inde conspicua. Cui affusa solutio aluminis, redditum instar putidae & subcineritiae putrilaginis, omni sanguinis colore prorsus abolito. Cui affusus spiritus vini, redditum turbidiorum, quanto cui oleum salis tartari. Cui spiritus salis Armoniacki, redditum omnium elegantissimum, colore floridum, tenuem substantiam, infuso sedimentum diaphanum instar Galatinæ rubrum.



It is also as manifest, that there are in the bodies of *men* and *women* *solutions* or *liquors* imbued with *sundry salts*, as *aluminous*, *acid*, and *vitriolate*, &c. which when they shall mix with the *injected blood*, what the *issue* may be, I leave the *Prudent* to *conjecture*. Certain it is, that for *these considerations* specified (reserving my own *Experiments* to my self) none but inconsiderate *Quacksalvers* would put a *Patient* upon the *trial* of *injecting* of *Medicaments*, or *transfusing* of *blood*. It is a course *Nature* (whose *Servants* and *Imitators Physicians* hitherto were) never prompted us unto: Having taken so many courses whereby *blood* might at any time of *need* issue out of the *veins* and *arteries* in *sundry parts* of the body: But especially provided that nothing might *immediately* come into the *veins*. Whatever comes into the *veins* by the *Stomach*, suffers a great alteration first, and whatsoever is *noxious*, either separates from it there and in the *guts*, or is *mortified*, or *mitigated* so as to be *innocent*, and agreeable to the nature of the *veins*. Which particular nature of the *sanguiferous vessels*, is that which in the *dead* keeps its own *blood fluid*, and in the *living* contributes so much to the *motion* of it, that if you make a *stop* and *intercept* the impulse of the *subsequent blood*, yet will the other *continue its course*. But what will the effect be of *Heterogeneous blood*? For undoubtedly the nature of the *veins* is agreeable to the *blood*, and communicates its *impurities* and *virtue*, as the *cask* doth to the *wine*. But further, since the *blood* is to pass through the *porosities* of the *Liver* and *Lungs*, and *capillary veins* and *arteries*, how will they agree with the *new blood*. (it being evident upon mixture of *Liquors*, and upon *burning*, that there is a difference in the *fibrosity* of the *bloods*, and consistence of the several *Serums*) or how will that *circulate* which results from the *mixture*, I know not, but certain it is, that the *ill consequence* is *almost*, if not *absolutely past remedy*.

In fine, what is it that is aimed at in this *Transfusion*? is it the *rectifying* the *mass* of *blood* (suppose *seventeen pound* in a body) with the affusion of a few ounces, or a pound of *Lambs blood*?

They

Vide ep. Walli de motu sangu.

They may as soon rectifie as much *vinegar*, or decayed *wine*, with the like proportion of *good wine*? would they amend the *impurities of the vessels*? there is the same difficulty as before. That which they *transfuse* is not a *Chymical spirit*, but an *impure*, and *heterogeneous* mixture, fitted by different *digestions* and *ferments* to a different *nourishment* of another *Animal*, with different *excrements* resulting from it. It is in the *Stomach* and *first digestion* where food is so concocted by the *Humane heat*, or *Acidity*, as to turn to a *chyle* adequate to the *nourishment of man*, and generating such *blood*, and such *excrements*, as are the result of such a concoction as is agreeable to the nature of *man*. And so it is in all creatures: Thus we see, that in different *Animals* different *Excrements* are generated, nor is it to be doubted but that the *concoctive* principle differs as much in a *dog*, or *cat*, as do those *excrements* which differ much from those of *men*, though both eat the same meat. *Sicut acidus spiritus quilibet animam inseparabiliter in ventre suo portat, atque in illud corpus, cui infunditur, dominium suscipit, illudque confestim juxta sui naturam format: hinc spiritus salis in Alkali Tartari fusus statim sibi format corpus salinum propriae naturae consentaneum, & fit sal: & aceti spiritus, vel acetum distillatum in eodem Alkali tartari sibi format corpus adequatum suae propriae naturae, & fit tartarus vini, & sic de vitriolo, & reliquis acidis: Ita quoque acidum Stomachi humani, cum apprehendit panem, vel quicquam alibile, in quod dominari possit, illud convertit & commutat in chylum, & exinde in carnem humanam: & eundem panem Acidum Stomachi canini convertit & transmutat in carnem caninam: uti & de reliquis viventibus quotidie docemur, eo quod natura in omnibus iisdem instrumentis operatur.* If the Case be such, and that the *blood transfused* hath received those *impregnations of vitality* which are agreeable to the nature of the *Animal* whence it is *transfused*, and is qualified to generate such *nourishment*, and such *excrements* as are the consequences of those *digestive characters* (if I may so call them) and *impressions*; How can we imagine that such *blood* being immediately transfused into

Otto Tache-  
nius Hippocr.  
med. clavis  
c. 9. p. 201.



our veins, without those previous alimental sigillations and digestions, produce those effects which are to be expected in humane bodies, and are (though irrationally) in this case wished for.

But perhaps they think to atchieve their design, by introducing a new texture in the vitiated blood, and vessels, or fermentation, whereupon should ensue the amendment. I perceive indeed by their stories a new fermentation, that the dogs piss blood (no desirable or trivial accident!) But what a little time is there for the blood to pass unto the heart, and mix with those other Liquors, and ascending blood, and so to pass into the Heart and Lungs? How do they know that the blood they transfuse is good? Upon burning they shall find a difference in blood of beasts; and a different taste and coagulation in the Serum. Besides, that the blood of young Animals is generally less balsamical and inflammable, of another texture and colour, the Serum very saline; and in a word, exceeding different from what is in men and women of years. And in the blood of men and women, there are often defects not to be perceived but by coagulating and burning of the Serum and blood. I have taken the Serum of a Maid seemingly healthful, only pained at Stomach, and abounding in blood, it coagulated and looked like tallow, and would not burn at all, and smelt noisemely after coagulation, not before. I have several strange instances of this kind. If there be such indiscernable causes of distempers, and mixtures in blood of persons that are not well, if they neither know what they aim at in transfusing in, nor what they transfuse, Let Mr. Glanvill talk of great Advantages to be expected, and let them try it for me. Sure I am that the Transactions report an Untruth, in saying that Coga was ever the better for it: I am told his Arm was strangely ill after it, and difficultly cured: and if all the great likelihood of Advantages from Transfusion that are in their present Prospect, arise from no other grounds, they are very improbable. The Parliament of Paris have forbid it to be prosecuted but by the allowance of the Parisian Faculty of Physicians. A Swedish

I had an intention to have set down at large all the Stories relating to the Transfusion of blood, with remarks upon them: but I was so much pressed to conclude, and had so little leisure to dispatch it in that manner at that time, that the Reader must be content with this brief, but I think substantial reply to all that hath yet been said.

See the Stories in the Philosophical Transactions.

I remember they say that it is not expressed, how the *Transfusion* was practised upon the *Baron Bond*, nor after how long time it was repeated when he died. But this is no excuse for them; for they have fixed no rules or circumstances whereby to regulate the operation, those are to be learned by frequent Experiments, and it may be, the death of more Patients. Next, it is not to be doubted, but that He that did it might act as cautiously as they, for his own credit, and the credit of the trial, and the quality of the Person. It concerns them to procure an Authentic Narration of the thing, and what appeared upon his being embowelled.

*Swedish Baron* died upon it: and to argue from the cures of *Madmen*, or from what they suffer without hurt, is not for a *Physician*, but for one that deserves to be sent to *Bedlam*: for mad people endures a thousand ills, and strong *Physick*, such as others cannot endure: and if they find any amendment sometimes by uncouth means, it is by accident, as it makes them ill, which sometimes prove their recovery.

As for dogs, they cannot declare what they suffer: but I am in haste, and refer my Reader to the perusal of the *Histories* in the *Transactions*: in which what I last objected, is all confessed: and if after all I have said, he find encouragement to try a remedy, that hath sometimes proved not unfortunate, (but is always rash) let him do it for me.

I am satisfied, That the operation carries more of terror (and many swoon upon bleeding) then a *poison*, or *Galenical Physick*; and that the greatest part of our distempers do not arise from the scarcity, or malignant tempers, and corruption of our blood, is as manifest as can be; more arise from the depraved motion, and redundancy of the blood, and serosities in and about the brain, and the laxity and strictness of the habit and pores of the body; and in these cases *Transfusion* is no remedy; much less in malignant diseases, in which to let blood is often mortal, commonly dangerous; and it always must be antecedent to *Transfusion*, excepting only the scarcity of blood; in which case what strength is there to assimilate, or ferment with the new blood.

As to the *Transfusion* of blood in *Pleurisies*, the attempt is very ridiculous, considering what an *Ebullition* and *Inflammation* of the blood there is then in the *Lungs*, whither the transfused blood immediately flows: what extravasated serosities do afflict those parts? how unfit are they for any seasonable fermentation? And in the *Small Pox*, how few are they



they in England which allow of *Phlebotomy* in that disease at all? and how irrational must that *Transfusion* seem, which disturbs and diverts nature in her present work? what hazard must the Patient run amidst a Fever, and that violent commotion of humors which afflicts his head, back, heart and lungs at that time, should he besides all other accidents fall into *pissing of blood*, a symptom so dangerous in that disease, and so usual a consequent of this Operation.

Having dispatched these papers thus far: the length of time since they were sent to London to be transcribed, perused, and several insertions made, according as my memory, amidst a constant employment, suggested any thing new unto me, and the delay of the *Printing* till *Michaelmas-Term*, gives me an opportunity to relate some Observations I made at Bath, during my stay there this Summer: As famous as the Bathes are, and of as general an use as they are (there being no better Remedy in the world for the Scurvey then the *Cross-Bath* regularly pursued, and as it might be, I cannot say is commonly practised) yet have not our Experimental Philosophers made any Inquiries into its nature and qualities: not a man of them ever so much as tried the mixing of several liquors and spirits with the water: as I did, and found no change upon the mixture of *Acid spirits*: but the urinous and volatile spirits of *Sal Armoniack* (drawn the *Leiden way*) and *Harts-horn* did change the water of the Pump in the *Cross-Bath* (which ariseth from the hot Bath) into a lacteous colour and opacity, insomuch that it represented an *Almond-milk*, and after a time there precipitated to the bottom an insipid Magistery resembling *Burnt Harts-horn* finely powdered: the precipitated powder was more copious in the affusion of the spirit of *Sal Armoniack*, then that of spirit of *Harts-horn*: and the former in that mixture lost its urinous smell, (and made no unpleasant, but an unctuous, soft, emulsion-like drink) which the other retained.

Not a man of them ever tried whether the several Bath-water would coagulate milk: which I tried first, and found that the *Kings-Bath* water makes *Pesset* with a soft curd, and whitish *posset-drink*, which will not become clear: the *Cross-*

*Bath* makes an *hard curd*, a *clean* but *whitish-posset-drink*: the *Pump-water* of the *Cross-Bath* (which ariseth from the neighbouring *hot Bath*) yields an *hard curd*, a *clear* and *very green posset-drink*; which being drunk by a woman that gave suck bred a great deal of milk (more then *fennel-posset-drink*) and made her break *abundance of winde*, which those usually do that drink the *Bath-waters*. And I believe this way of giving the *Bath-waters* might be no *small improvement* of *Physick*, were those courses taken *there*, and that *method* which those that understand the *ancient* and *modern Bathes*, and waters that are drunk, might easily pitch upon: but this is above the reading of our *Comical Wits*.

I could find no grounds to believe there was any *sulphur*,

Mr. Ch. Hotham, when I shewed him some of the extracted Salt, did conceive it to be a mixture of *common Salt*, and *vitriol of Iron*.

When I was there, a *Spring* of the *Cross-Bath* being lost, they digg'd for it; I talted the *Earth*, but could finde nothing *nitrous* in it: opening the *gutter* by which that *Bath* empties it self, we found the passage crusted very thick, with a white *lapideous concretion*, rough and unequal in the surface, with several *crystals* fixed in it, resembling those of *cream of Tartar*: to taste, it was *insipid*, and of substance like to what precipitates with *urinous spirits* in the water: but after it had lien on the tongue a while, some peeces discovered a taste exactly like *cream of Tartar*, others an *adstringion* somewhat *vitrioline*. I brought some away, and intend to examine it further.

or *bitumen* in the *Baths*: but rather some odd *Alkali* mixed with the *vitriol of Iron*: I extracted the *Salts* by *evaporation* of two gallons of the *Cross-Bath-water*; and having reduced them to three quarts I set it to *shoot*; but there was no appearance of *salt-peter* at all: then I evaporated it to *three-pints*, but still neither *salt-peter*, or any other *salt* appeared: then I evaporated it *quite away*; and then I had about two ounces of a *dark coloured salt*, which at first resembled *cream of Tartar* somewhat in taste; but having lien longer on the tongue, it resembled very much the *Vitriolum Mortis*, with some more

*Alcalifate taste*: I performed the *Operation* both in *Iron* and *Glass-vessels* with little difference of the *taste*, or quantity of *salt*: some of the said salt dissolving into a *moisture* in the *air* did eat off the *writing* upon such papers as it fell, and turned the paper *yellow* all over; and rotted it. I made a *Lixivium* with the *Cross-Bath water*, and evaporated that, thinking that if there were any unctuous matter in the water, it might hinder the discovery of the *Nitre* in its *shoot-ing*; but neither could I finde any thing of *Nitre* this way: but



but still there was a taste of the *Vitriolum Mortis* in the salt: and one Mr. Berenclaw a Practitioner there assured me, that he had known the Bath-water drunk, and to have tinged the *Excrements* black, but I cannot avow the truth of that.

I inquired about the truth of what Dr. Mearn had writ about the Stone he took up, upon *Lands-down*, which being infused in water produced a resembling heat and taste to what is in the Bath: But Dr. Maplet, an inquisitive and learned Physician there, who was with Dr. Mearn then, and had some of the mineral stone, assured me it was a *lime-stone*: so did Mr. Chapman an observing Apothecary there, who likewise saw the Stone, and tasted the infusion. In fine, where Dr. Mearn took up that Stone, any man may take up a thousand, they not being cast out of the Earth, but dropped out of the *lime-carts* which pass that way into *Bathe*, the *Kills* being thereabouts.

The stones in the bottom of the *Cross-Bath*, many are of reddish rusty colour, others green: but concerning the *Bathe*, I may next Summer, during my stay there, in the midst of June and July (if God give me life and health) make a further Narrative: I only mention this to prevent the *Virtuosi* from usurping upon my discoveries and intendments. Yet to do them some justice, I was told that in some of their Transactions, they have this observation about *Bathe*, that if any person that is drunk go in there, the Bath will make him sober: If any that is in the Bath drink freely there, it will cause him to be presently drunk, with less drink by far than if he were out of it. This report is worthy of our Philosophers, and advanceth their intelligence above the credit that Aristotle and his Hunters deserve. The first part is defective, for it should have been added that the drunk person must sit still, and sweat soundly: if he stir up and down or swim, he shall be more sick than if he had never come in. The second part is notoriously false, and all the Bath-Guides and others that have tried it, avow, that 'tis usual for the Townsmen to sit some hours and drink in the Parlour of the *Queens-Bath*, and never be drunk: and they say, a man that sweats there shall bear much more drink, than if he were out of the Bath: which I thought rational and agreeable to what I had observ'd in the *Indies*, where men sweat and have more drink than in *England*, and stronger.

But I come now to that Case, for which I adde this *Discourse*, and that is, Observations upon the mixture of the *Bath-water* and other *Liquors* with *blood*, and the *Phænomena* thereupon, which, though I might reserve for that other discourse of mine about *Phlebotomy*, yet I will oblige my Reader with some of those *Curiosities* here, especially since it will give him occasion to reflect how facile it is to multiply such *Experiments*, and how negligent they are who pretend to be the grand *Observers* of this Age.

When I went to make use of the *Bath*, amongst other *Preparatives* thereto (which are better taken upon the place, then at a distance) I caused my self to be let *blood*, and being willing to improve that occasion as well for my instruction, as health, I caused several *Venice-Glasses* to be filled with several *liquors*, each liquor amounting to some three ounces, and into each glass I suffered to run as much as half an ounce of blood, or little more; taking no other measure, then that the whole liquor seemed of a deep blood red. The *Phænomena* thereupon were these ensuing, being observed presently after I had bound up my arm, and was in condition to write.

1. That *Glass* which contained the spirit of *Sal Armoniac* (drawn the *Leiden-way*) kept of an equal consistence from top to bottom, being of a deep red, and not transparent, like *Tent-wine*.

2. Into two several *Glasses* I had dissolved the *Salts* of *Ash* and *Wormwood*, half a dram in three ounces of water; the solutions of these two *Salts* shewed no difference at all; the top, after some space, was of a florid red, (such as is visible in watrish blood) for about a quarter of an inch: the bottom was of a more dark red, and resembled *Tent-wine*.

3. A fourth *Glass* held *Oleum Tartari per deliquium*: the blood and that liquor did not first mix, but were as two distinct liquors, notwithstanding that the blood had streamed into the *Glass*: After a while the blood and oyle mixed together, and it all became of a deep red from top to bottom; the surface only was transparent, and of a brighter red, as that of the other *Alcalisate Liquors*, but not so far downwards: the rest was as *Tent-wine*.



4. I dissolved half a dram of *Allem* in three ounces of water, and upon bleeding thereupon, all the *crimson* of the blood was immediately destroyed, and it became almost as black as *Ink*: after a little space towards the surface it cleared up: there were certain *bubbles* on the top that continued the redness.

5. Another Glass held a quantity of the *Kings-Bath water*, the blood that did stream into it, appeared of a dark red, but transparent, as deep *Bordeaux* wine shews: a little below the surface it was deeply red, not transparent, but like *Tent wine*.

6. The *Cross-Bath* altered little from the *Kings-Bath*, saving that the transparency of the surface extended it self downwards to a greater profundity then the other.

7. A Solution of half a dram of *Sal prunella*, yielded a blood on the surface like to that of *Salt* of *Wormwood*, but not to so deep a descent: otherwise it was of the colour and consistence of *Tent wine*.

After they had stood in the window about five houres, I returned and observed these *Phanomena*.

1. That with the *spirit of Sal Armoniack* continued like *Tent-wine*, only the uppermost part of it to the thickness of a *barley-corn*, was diaphanous as deep *Bordeaux-wine*.

2. That with the *Sal prunella* coagulated into a *Mass*, shrunk from the sides of the *Glass*, and sunk to the bottom, leaving them super-natant water of a pale citrine colour; the *Mass* it self being of a florid red on the surface, and of a deep red, not blackish, to the bottom, that I could perceive.

3. That with the *Cross-Bath water* changed not, but seemed thick as *Tent-wine*, the upper part being diaphanous, and like deep *Bordeaux-wine*?

4. That with the *Kings-Bath water* changed not; only the diaphanous surface extended not it self downwards so far as the other *Bath-water* did.

5. The *Solution of Allem* continued all fluid and black; no coagulated *mass* therein: but the *bubbles* had lost their

their crimson-colour, and were become cineritious,

6. That with the Salt of Wormwood resembled deep Bourdeaux wine, but was less diaphanous a little below the surface: The surface extended downwards to the length of a barley-corn with a perfect transparency.

7. That wherein was the Sal fraxini was diaphanous to the bottom; no innatant filaments or coagulated mass in it: But the surface to the length of a barley-corn was like decayed Claret made with a mixture of white and red wine: the residue was deeper like that of Bourdeaux.

8. That with the oleum Tartari per deliquium was diaphanous to the length of a barley-corn, and of the colour of Bourdeaux wine: the lower part un-coagulated, and like Tent wine.

9. It is to be noted, that the reflexion of the Glasses in all the Liquors, they being held up to the light, (except the spirit of Sal Armoniack) did create a corona of several colours, mixt with green, blew, and so as not one resembled the other. That with the oleum Tartari per deliquium resembled the blew in Bourdeaux wine, with an eye of green.

I had forgot to relate how I kept some of the blood in a separate Pottinger; and it seemed excellently well coloured; when it coagulated, the top was of a due red, the bottom blackish red; the serum of a due transparency and proportion, and not tinged to citrine colour: and coagulated all as the white of an egge over a gentle fire.

I poured also upon the blood in two other Pottingers; upon the one spirit of Harts-horn; on the other spirit of Sal Armoniack, but not much: perhaps a dram or more: that with the spirit of Harts-horn at first seemed more florid, then that with the spirit of Sal Armoniack: both coagulated into Masses after a while, and were then both of one colour on the surface: but that with the spirit of Sal Armoniack coagulated its Mass so as to break from the sides: that with the spirit of Harts-horn did not break from the sides; whether the blood of one, and the other might differ, I know not; but both immediately followed one the other. That blood which had nothing mixed with it, after coagulation, differed



ferred not from the other two, though they were covered over with the *spirits* as soon as they were taken, and that exposed only to the *Air*.

After a while upon the *surface* of that with the *Kings-Bath-water*, there was a kind of fatty *cremor* which covered the whole *surface*; and so on that with the *Queens-Bath-water*: the others had none at all.

On *Munday* after dinner, the next day after I had bled, I came to observe again; and found,

1. That with the *Sal fraxini* to be more and more diaphanous, resembling *Bordeaux* wine: that with the *Sal absynthii* less diaphanous, but red still.

2. I observed the *Solution of Allom*, and however it looked black, yet being held in a clear light, one might discover in it visible appearances of a deep red. I poured on it some spirit of *Sal Armoniack*, to see if it would restore the colour: but in stead of that the *liquor* coagulated presently into little *massula* or flakes, resembling raw flesh when the blood is washed out.

3. There was no alteration in that with the *spirit of Sal Armoniack*.

4. That with the *Queens-Bath-water* continued more diaphanously red towards the top: but that with the *Kings-Bath-water*, did not lose its redness, though it were not diaphanous near the surface.

5. Of the two *Pottingers* in which were the *spirits of Harts-horn*, and *Sal Armoniack*, though both were coagulated, yet that with the *spirit of Sal Armoniack* was the most florid.

6. That with the *Oleum Tartari per deliquium* continued red, but lost its diaphaneity at the top almost quite.

7. That with the *Sal prunella* after the coagulated *Mass* had subsided, had on the top of it in the middle of the *Glass*, to the breadth of six-pence, a concrete gelly, exactly resembling that of the clearest *Harts-horn*, not boyled up to its greatest height; from

from hence protended certain filaments, with which it was fastned to the *mass of blood*, which was *buoyed* up thereby, so that it touched not the bottom; the *jelly* was *insipid* and stuck to my finger, when I touched it: whether that little which did so adhere took off from the *equipollency* of the two bodies; or whether I broke casually some of the protended filaments, or from what other cause I know not; but after a while the *Mass* sunk quite to the bottom, and drew the *gelatine* below the surface of the water.

8. Upon the pouring out of the blood, that with the *Queens-Bath water* happened to seem of a *pure Claret*, like *Bordeaux wine*, no *setling*, or *floating filaments*, but *something red*, which resembled exactly the *flying Lee* in bottled *Claret*.

9. That of the *Kings-Bath water* appeared as the former, only at the latter end, as it was poured out, there was a certain *gelutine* mixed with it, and sticking to the sides, that for colour and *consistence* exactly resembled the *jelly* of red currants.

10. That with the *spirit of Sal Armeniack* upon effusion, appeared like deep *Bordeaux wine*, and so from top to bottom *without any alteration*.

11. Upon the effusion of that with the *salt of Wormwood*, it appeared also like to *Bordeaux wine*; but towards the bottom there was *Gelatine* red, like that of red currants, more tenacious and in greater quantity then was in that mixture with the *Kings-Bath water*.

12. That with the *sal fraxini* poured out like common or less deep *Claret*: at the bottom there was no *Gelatine*, but it ran a little thicker like to *Tent wine*.

13. That with the *Oleum Tartari per deliquium*, upon its first effusion ran like *Claret* a little decayed: but the most of it dropped, as if it were a weak *Gelatine*, and so continued to the last, being almost of as deep colour as a ripe *Mulberry*; I poured upon some of the said *jelly* almost as much of the *spirit of Sal Armoniack*, and it immediately dissolved all the *jelly*, and made it *fluid*, yet so as that the *bloody crassament* appeared *unequally mixed*, some parts being more deep and opacous then others.



14. I took the Pottinger in which was the *blood* with the *spirit of Harts-horn* affused to it, having separated the *mass* from the *sides* of it, I poured out the *Serum*, which was as *black as common Ink*: the *surface* was *red*, but not so *florid* as that with the affused *spirit of Sal Armoniack*: most of the *melancholy blood* seemed dissolved into that *black Serum*, the *super-incumbent mass* being *thin*.

15. That *blood* on which the *spirit of Sal Armoniack* was poured in the Pottinger, appeared from top to bottom *red*, only in the bottom there were some little spots of a *blackish* and *darker red* then the other parts: on the *surface* there was a *Gelatinous pellicle* generated: the *Serum* was of a *citrine* colour: the *consistence* of the *coagulated mass* of *blood* here was more *tenacious* and *fibrous* then in that other Pottinger with the affused *spirit of Harts-horn*: There was no *pellicle* discoverable upon that with the *spirit of Harts-horn*; upon that with the *spirit of Sal Armoniack* so tough an one, that it would bear up a little way in your hand the whole *mass* of *blood* adhering to it.

16. The *blood* which was kept in a Pottinger without any mixture, being placed in an *arched fire* on a *fire-shovel* burned with a *bright and continued flame*, as if it had been *Turpentine*, but crackled like a *green bay-leaf* cast into the *fire*: and so it did being cast immediately into the *fire*, but the *crackling* was less durable, by reason of the *vivid fire* into which it was cast. It is to be noted that this pottinger having been removed into the *Sunne*, all the *Serum* was *exhaled* or *incorporated* into the *mass*, which was grown to the bottom of the Pottinger, and dried there, so that I scraped it off: whether that might adde to the *Phænomena* I know not.

17. The *blood* in that Pottinger where the *spirit of Harts-horn* was affused, being taken out and placed in an *arched fire*, rose up with an *equal intumescence*, as a *cake* doth in an *Oven*; it crackled much less then the *unmixed mass* of *blood*: It burned slowly, with a *continual* but not *vivid flame*, and in such a manner as if the *mass* had never taken *fire*, but only the *smoke* issuing from it; for one might easily see an *interspace* betwixt the *mass* and *hovering flame* all the

T

while

while; till it came to a perfect Ignition.

18. The mass which had spirit of *Sal Armoniack* affused unto it, being placed in an arched fire, did rise with an equal intumescence, but greater then that with the spirit of *Harts-horn*: it crackled less then that with spirit of *Harts-horn*: the flame at first resembled that of the other; afterwards instead of hovering about, it seemed to issue immediately from the blood, and not to appear like a smoke that took fire within the arch; the flame then was vivid, and continued.

19. The fire being an exceeding quick fire, I poured some of the serous blood that was in the Pottinger, impregnated with the affusion of the spirit of *Sal Armoniack*, and as it dried it took fire presently, the flame resembled that of the former mass, only it wasted faster then that, being cast upon so quick a fire: The black Serum of the coagulated mass with affused spirit of *Harts-horn*, though cast into the same fire, would scarce burn at all.

20. I took some of the mass that was impregnated with the *Sal prunella*, and placed it in an arched fire (the Serum or Solution poured off from it was insipid) it rose with an unequal intumescence coping, like a loaf, in the midst: I brought it to a perfect ignition and coale, yet did it not crackle at all, neither burn till the last, and then but a little, and with an interrupted flame which seized now on this, now on that part: nay, there was but very little sign of any *Sal prunella* in it to sputter as it burned.

21. I told you how I poured some spirit of *Sal Armoniack*, upon the mixture of blood and a Solution of *Alom*, and of the odd coagulation that hapned thereupon into white massula which seemed like flesh when the blood is wasted out of it: I took of those incoherent flakes or massula, and putting them to burn in an arched fire upon the fire-shovell, it run all off, upon a great ebullition, into the fire: I took the red hot fire-shovell, and placed some more upon it, which seemed to burn as *Alom* doth in the like case, and so stayed on it: but being put into the arched fire, and brought to ignition, it would neither flame, nor crackle, nor left any visible quantity.



tity of coale or ashes behinde it, as if it had almost all evaporated.

22. These were the *Phænomena* which I had opportunity to take notice of at that time: but I also left a *Solution* of the *Alkali of Nitre* of about three ounces with the Apothecary, if any else came to bleed there in my absence: upon bleeding, an healthy young man that was somewhat indisposed, some was suffered to stream into that *Solution*: at first it was of a florid red, but paler then blood usually is, resembling a *bastard-scarlet*: after some days standing I found it of a deeper red from top to bottom: one half of it was transparent like to the duller and more decayed sort of *Claret*: the other half seemed like *Tent-wine*, not diaphanous: on the surface there was a *cremor* which extended it self almost all over it: Upon pouring it out, it appeared all to be of a blood-red, only that which ran last was of a deeper dye: at the bottom there was a kinde of *Gelatine* like to that of red *Currants*, which rendred the one half of it opacous: it was no way dis-coloured, nor unequally mixt: the spirit of *Sal Armoniack* being poured on it, did render it fluid presently and transparent.

Having occasion after some weeks stay at the *Bath*, to ride in extreame hot weather above 200 miles in a few days, and being tired with watching and the journey, and being wet very much with a great shower of rain at my return, I went immediately into the *Cross-Bath* for half an hour, to prevent any inconveniences that might befall me upon such travel: but at my coming out of the *Bath* I felt so violent a defluxion into my throat, and the adjacent *Glandules*, that I apprehended some danger of a *Squinoncy*, which yet I avoided by bleeding, purging, and other means together, with the use of the same *Bath* after all: when I was to bleed, I was willing to try some further *Experiments* in *Liquors*, different from the former, and the *Observations* I made were these.

1. I caused *two veins* to be opened in the *left arm* at once, and received one Pottinger out of the *Mediana*, and the other out of the *Cephalica*: my intent in that was to observe (as I had done once before in my self) whether the blood of *two veins* in the same arm would yield *different blood*: if so, then I thought that it might not be indifferent in what *vein* a man bleeds, though they all arise from one trunk of the *vena cava*; and that we might justly have regard to those cautions of our observing *Ancestors*, not to bleed those veins promiscuously, but some in one case, and some in another. I was confirmed in those sentiments by the *Phænomena* I met with a second time in the *trial*, as other observations have satisfied me about the doctrine of *revulsion*, and its truth. Having taken one Pottinger out of the *Mediana*, and another out of the *Cephalica*, I stopped the *Mediane*, and continued to bleed into the *liquors* out of the *Cephalick*. In the first, issuing out of the *two bloods*, I could finde no difference in the colour or consistence; but after standing three or four houres, that of the *Mediane* had much less of Serum in it: the Serum thereof seemed *Limpid* in the Pottinger: but that of the *Cephalick* was *citrine-coloured*: that of the *Mediane* somewhat of a *volatile saline* pungency upon the tongue, different from the taste, which the other Serum had, that being very salt: that of the *Mediane* had a *blewish Gelatine* gathered upon the top of the condensed mass of blood; the other had none, but was of a florid red on the top. After two days I came to look on them again, and upon turning the coagulated mass of blood in the pottinger, that of the *Mediana* had much more of black towards the bottom, then the other: and also a thinner surface of red then that of the *Cephalick*.

2. To carry on the Experiment of mixing several liquors with blood, I bled into some ounces of *Aqua mirabilis*, which grew deep coloured almost unto the top, which was transparent and of the colour of *Mant-wine* almost: after some houres the Liquor became of a bright beautiful *Claret-colour* almost unto the bottom, where there was an opacous, dark-red settling, with an *enaeagma* of contexted filaments pretended to



to the top. The *Wasps* flocked to *that glass* in great numbers, and drowned themselves in it, not meddling with any other of the subsequent *glasses*. After two days was little changed, only the beautiful *Claret* was somewhat darkened.

3. I bled upon some ounces of *Treacle-water*, which turned as *black as Ink* presently, but continued the blood perfectly *fluid*: The *red* was so destroyed, that the *Aluminous Solution* did not equal it; there not being upon *inclination* of the *glass* the least sign of any *incarnadine*; and so it continued for two days, no variation happening.

4. I bled upon some ounces of *Cinnamon-water*, which turned of a *pale red*; if I held up the *glass* to the light, it seemed almost to the top *opacously red as Tent wine*; but, if viewed otherwise it seemed of a *paler red*, approaching to *bastard-scarlet*. After a while it seemed as if all the blood were coagulated into one *mass* from *top to bottom*, subsiding a little within the tinged *Cinnamon-water*. Upon agitation and stirring with a *knife*, it appeared that the *fibres of the blood* were so destroyed, that this *mass* was no coherent thing, but broken into little *massulae*, or parcels of a *pale red*, such as the *subsiding curds* are in *whey*. After two days I viewed it, and found the *Phænomenon* of the whole *Glass* to look *cherry-coloured*, but the *incoherent massulae* were of a *pale red*.

5. I bled into some ounces of *Aqua Bezoartica*, that did coagulate with the blood, so that it all fell in one *incoherent mass* towards the *bottom*: but whether there hapned to be a greater proportion of blood in the *glass*, or for some other cause, the coagulated blood filled almost all the water, much beyond what we observed in the *Cinnamon-water*: the consistence of the one, and the other *massulae* were like the curds in whey; these were of a *pale red* retaining to *whitishness*; and so it continued two days; the *small-quantity* of water appearing in it giving no opportunity for further *Observations*.

6. I bled upon some ounces of *Nantes-Brandy*, it gave us a more *tenacious curd* than the former, of a *pale red*: but the *mass* and *liquour* was *opacous* towards the bottom, so as to appear

appear like *Tent-wine*, in what light soever I placed it. After two days that of the *Brandy* which was *fluid*, (the curd not being answerable to the *Aqua Bezoartica*) was of a pretty *florid red*, the *coagulated mass* was of a *brick colour*.

7. I bled upon some ounces of *Anise seed water* drawn from the grounds of beer, it yielded a mixture of a *deep blood red* from top to bottom, somewhat transparent. The mass coagulated from top to bottom, the curd was of a deeper red then the others, and of such a tenaciousness as is to be found in the soft curd of *possets*. After two days it turned *blackish*, the *coherent curd* being of a little *lighter red*.

8. My *indisposition*, and other cares permitted me not to prosecute these Experiments as I did the other: but one curiosity more possessed me, to put two drams of *spirit of Harts-horn* into a pottinger, and to bleed thereupon, to see if it would alter the *Phænomenon* from what it is, if the *spirit of Harts-horn* be poured on the blood: I did so, and I found at this time that it kept my blood from coagulating into such masses as otherwise it would, but the blood turned *blackishly-red*, and in it there was observed a *crimson-gelatine*, which run off the knife as *jelly of red currants* would, when beginning to cool. After two days it continued *still fluid*, but *blackish*. I have sundry times tried that way of putting *spirit of Harts-horn* into the pottinger first, and then caused them to bleed upon it with this success, that immediately it spoiles the *red*, giving it a more *dirty colour*, and casts up a *mucous phlegme*, (such as I never saw in any blood upon other *Essays*) just like what many spit and blow out of their noses in catarrhs: this covers all the pottinger, without any mixture of blood in it, and would be *white*, but that the *sub-jacent blood* gives it another *muddy colour*. The blood under it was always *fluid*, and unequally mixed with parts of a bright and *blackish red*. Whether my *journey*, or distemper prevented that *appearance* in my blood, I know not.

9. I had a Patient there which had unknowingly taken much of *Mercurius dulcis* in pills at London, to her



her great prejudice several ways: and though she had taken *golden-bullets*, and used other means to discharge her body of that *troublesome Inmate*, yet found little benefit: At the Bath I let her blood, and to try an *Experiment* I cast a *Guinny* into one of the *middle Pottingers* as she bled: I could observe no difference betwixt the blood preceding, and that therein: but in the *afternoon* I came and went to that *pottinger* which had the most *florid* and best coloured blood, and searching there found my *gold*, and that stained with white spots from the *Mercury* on the *lower side*. Whether the *separation* of the *Mercury*, or some other efficacy in the *Gold* (of whose power in such cases I can give good instances) caused that difference in the *bloods*, I cannot tell, having never tried it since.

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*Being not well at Warwick, by reason of a violent defluxion into the Glandules of the Throat, I caused my self to bleed*  
Octob. 20.

1. I took six drams of spirit of Harts-horn, not very well rectified, nor clear of colour, and put it into a crystal-glass; and bled thereupon about half an ounce of blood; it turned of a *dark red* presently, inclining much to *black*, though, as it stood, or as it was held on one side, you might perceive a lighter, but not *florid red* at the sides. It seemed *fluid* for two dayes; but as I poured it out it appeared to be very *Gelatinous*, and of colour like that which is become *sanicus*, and degenerated into *blackishness* with keeping.

2. I bled upon the *same liquor of Salt-peter*, about half an ounce of blood, upon four ounces of liquor, at first the blood did turn on the surface to a *bastard-scarlet* (which is an effect every thing of *Nitre* mixt with blood so produceth)  
after-

afterwards the whole blood sunk to the bottom, the upper part being all of *one colour and consistence*, such as is observed in the *Serum* of the blood sometimes, when the *supernatancy* is whitish, and not transparent. Being poured from the *blood*, I found that coagulated into a *mass*, which was all of a very *natural red* all over, only *spotted* in many places underneath with *black spots*. The *concretion* was so brittle, that it would not hang together, nor endure any *light pressure*, but as it were *melted*, and seemed *gelatinous*.

3. I bled upon a *Solution of the Alkali of Nitre*; it appeared upon the first mixture like *bastard-scarlet*; then the blood sunk to the *bottom*, the *top* being *transparent*, yet of the colour of *High-countrey-white-wine*: the bottom seemed *redder* then that of the *former*; the *limpid liquor* being poured out, seemed all *gelatinous*, and had incorporated with it the *serous part* of the *blood*: the *red* at the *bottom* was *fluid* and not *tenacious*, but of the consistence that blood is of when it is *hot*, and newly received in a vessel out of the *veins*.

N.B. After I had poured out the *blood* and *mixtures* out of the several glasses, and that the glasses had stood a while, I observed that that of the *raw Liquor of Nitre*, which remained in the bottom, did turn of a most beautiful red, as ever I saw in any thing: but that with the *Spirit of Harts-horn*, or *Solution of Alkali*, &c. did not vary: after two days all the remains of *blood* in the several glasses turned *blackish* and *sanious*, only that with the *raw liquor* altered not.

4. I bled upon the *liquors of Salt-peter* which had passed the *ashes*, and on that which had never passed the *ashes*: both were of the same *blackish* and *sanious* colour (after the first *bastard-scarlet* was past) both had on the top a certain *cremor*, which being cast into the *fire* discovered it self to be *nitrous*: both of them, though they were of such a *dirty red* inclining to *black*, yet were they of *one consistence* from *top to bottom* all *fluid*, nothing *gelatinous*, nor any one part *black*er, or *redder* then the other. Which is very much, considering the difference of the *two Liquors*.

5. I bled upon the *unctuous Mothers of Salt-peter*, which turned at first to a *bastard-scarlet*: the *blood* did never mix with



with the *Mothers*, nor otherwise ting *their* colour, then as it cast a shadow by its innating on the surface of *them*. It coagulated on the top of the *Mothers*, being of colour all thorough exactly like to *Ocher*: the concretion was a quarter of an inch thick, a firm mass to see to, like so much *bees wax* cast into a cake: I took it up in one mass with my knife but trying its *tenaciousness*, I found it as brittle as most *short cakes* are. Upon the *surface*, there was an appearance of certain *stria*, which might be *saline*. All the blood did not coagulate so, but underneath there was a quantity which in the glass was of *equal dimensions* with the *other mass*, it was of the colour of *Oker*, and *fluid*, and would not mix with the *Mothers* at all: I took of the *mass*, and tried to burn it in an arched fire twice or thrice, it boyled and bubbled up upon the fire-shovel, like impure *Niter*, and so burned with a flashing, as if it had been most of it *Peter*, it never came to flame as *blood* doth usually; only one blaze as it were always hovered over it for a moment or two, not being continued to the body, otherwise then by a parcel of *smoke* issuing out them.

6. I took also two pottingers of blood, the *first* and the *last* of the *blood* I took away: there was no difference in the blood of one and the other; the coagulated mass well-coloured, of a good *consistence*, less of that *black* or *melancholick* crastament then is commonly found: the *Serum* well-coloured, of a fast *brinish*: I placed it in an *arched fire*, it rose up with a *globous intumescence* (but crackled not so much as at *Bathe*; though very much, and like a *bay-leaf*) it burned with a continued, vivid, and lasting flame.

I suffered a *pottinger* of the same blood with which this last *Experiment* was made, to stand ten days or more, in which time it was quite dried up into a *hard fryable* mass, the top of which was almost as black as *Ink*, the *bottom* having somewhat of a *dark red* in it. I cast a piece of it into a quick *coal-fire*; therein it crackled like unto a *bay-leaf*, but burned with a short and *weak flame*. I placed another part of it upon a fire-shovel in an *arched* and *quick fire*, where it crackled as much as the *other* did (and more then that part

of the same blood which was burned in the fore-going Experiment of blood newly congealed, and separated from the Serum, which was in this last case dried into the mass) and it did burn with a vivid and continued flame presently. Which accident I take notice of, to shew the different Phenomena upon the diverse way of burning the blood. I took a third portion of the said congealed and firm mass of blood, and put it to some cold water in a Glass, and it dissolved most of it therein, and tinged the water of as beautiful a red as any claret, though otherwise the mass were blackish, and had nothing of red but what was in the extimous crust of the bottom, which seemed of a most deep red inclining to black.

I suffered two or three spoonfuls of Hogs-blood to run into a large Venice-Glass, in which was halfe a pint of the Mothers of Peter; I suffered it to stand some days, and coming then to see it, I observed that the Mothers were become opaque almost to the bottom, on the top was a mass of coagulated blood exactly resembling the colour of Oker; it was so firm, that I took it with my knife in one entire piece, but I found the top and bottom of the mass (which was pretty thick) to be very soft, but not as it were fibrous; the middle was more firm: I put some of it upon a fire-shovell in an arched and quick fire, when it boyled up, and ran about, and by its sputtering discovered a mixture of Salt-peter: but it did not flame at all, though I brought it to ignition. Examining the remaining Mothers, I found a sanguine mixture to float in, and stain the liquor of an Oker-colour, and some of it was aggregated into little masses or lumps, whose particles did not cohere by any tenacious fibres (indeed I have not been able to observe any tenaciously-fibrous coagulations in the blood of Hogs hitherto) but upon the least touch of my warm hand, they dissolved or yielded unto the least pressure. Out of all which I intend to deduce, that some common Experiments may shew that, which no Chymical Fires give any light unto. That there is a great diversity betwixt the blood of other Animals, and that of Men: because that upon the same Liquors they disclose different Phenomena; and consequently that the Transfusion is a rash and unsafe attempt.



I shall conclude with this *intimation*, that neither is the blood of several *Animals*, nor the blood of the same kinde of *Animals* the same; but in *taste* and colour of the *Serum* there will be often a sensible difference, and it is rational to think the like of the blood it self: nor do they *burn* or coagulate alike, or with the like *Phænomena*: nor is the blood of the same Men always the same, though he continue within the latitude of *Health*; and in diseases *Epidemical* let two bleed, and there shall often be no affinity in the colour of their blood, or in the *Serum*, the one being *white* and *turbid*, the other *Limpid*, the *Serum* of the third *citrine-coloured*. And if so, what *regulations* shall we have for this operation: shall a *transfuse* he knows not what, to correct he knows not what, God knows how? This may become indeed that sort of men, being the worst and most irrational *Empirics* the Sun ever shined upon, as I demonstrate more fully in my Letter to a *Physician*, in a Parallel betwixt them and the ancient *Empirics*.

Let them from these *Observations* draw their *sophistical Conclusions* for and against *spirit of Harts-horn*; for, and against *spirit of Sal Armoniack*; against *Allom*, and *Treacle-water*, and such like; till all the world come to admire them as much as I: And that there be a new *History* penned to render them as contemptible as this magnifies, by a *Rhetorick* that hath more of the nature of the *Microscope*, then of *Truth*.

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*Miscellaneous Additions by way of Postscript.*

Whatever may seem to be said from hence in favour of the spirit of *Harts-horn*, is not so *valid* as may be imagined: for I have mixed a little of the Solution of the *Alkali* of *Nitre* (which turned *Syrup* of *Violets* green,

The other day coming into my *Apothecaries Shop*, and finding one (not otherwise very ill) going to bleed, I sent for a bottle of that *Lixivium* of *Salt-peter* which had passed the ashes, and into the first *pottinger* which he bled, which seemed to have little of *crimson* in it, but a *Serum* of a *dark-blue* colour; I poured a little of it, and it turned *black*, though it continued *fluid*: into the third *pottinger* which seemed better blood, with a *red* colour, I poured some of the same *liquor*, and it improved the colour, and kept it from *coagulation* awhile; what hapned afterwards I had not leisure to observe.

and rendred it less *fluid*) upon the *blood* of a man, which was *blackish, waterish, and ill-coloured*, after it began somewhat to coagulate, and I brought it to a new *fluidity*, and as *vivid* a red as ever I saw: and so it continued for 24 hours; at my return after two days, I found the blood in the Pottinger, (by reason of the Sun on the window) all coagulated, and become *friable*; but even that it had visible signs of a *remaining redness*, which the other blood that had nothing effused retained not. Oyl of *vitriol* affused to the *Serum* of blood, tinged with the *crimson part*, doth improve the red for an *instant* or two, but then it turns *black* and coagulates into a soft mass, that admits the least impressi<sup>o</sup>n; the *fibres* being destroyed: but yet it burns rather *better, brighter, and quicker* then otherwise; being poured on the surface of coagulated blood, on the top whereof was tough *pellicle* generated; it did not eat the *pellicle*, but in one night reduced the Mass, almost to the bottom, into a consistence like to *Bees wax*, which *burnt* well.

In *January* last 1669. I had another occasion to bleed, but though the *Phænomena* of my blood upon the *Mothers of Salt peter* were the same as at first; yet in the other mixture with *Salt-peter-liquors*, they were not: the *blood* separately taken seemed not to differ from the former, only the *Serum* was a little yellower: it did burn as well as *before*, but *crackled* much less. At the same time I caused an old man to be let blood for a *catarrh* and pain in his shoulder, which he used to ease with bleeding; the *blood* seemed very good and well-coloured; after it had stood awhile I had the leisure to view it, and upon one pottinger of coagulated *blood*, I poured twenty drops of spirit of *Vitriol*, whereupon immediately all the top turned as white as *milk*, even the *bubbles* which seemed of *blood* before: whereupon I took another pottinger, and separated half the *blood* from the *Serum*, and poured on the blood and *Serum* som spirit of *Vitriol* as before: presently all the *Serum* became of colour and consistence like *milk*: the *blood* turned *black*, and hardened into a substance that cut like *white-washed-wax*: the other, at my return, I found of the consistence and colour of a common *custard*. The *vitriolated*



*vitriolated Serum* would not flame: the *vitriolated* blood did burn with a brisk but short flame: the *simple blood* would scarce burn at all, but with an *hovering* and *discontinued* flame.

I took also some of the pure *citrine Serum* of my blood, which tasted not very salt; I set it in the window for some time: during the *frost* it coagulated into a body of the *consistence* of *butter* in the heat of *Summer*: it gathered no *Ice* at all: the *colour* became less *citrine*; but still *pellucid*. I set it after some days to thaw; which it did immediately before the fire, but came not to its former *fluidity*, but like *oyle*: after that, it coagulated with the warmth *before the fire*, and seemed exactly like to *boyled Turpentine*, but that it wanted the smell: it would not flame at all (though crackled much, as salt) yet I brought it to *ignition*.

I did also take some *Hogs blood* again, and poured on the *Mothers of Peter*, it mixed not; only after some days some *filamentary corpuscles* subsided unto the *middle* of the liquor: the colour at first was a *pale bastard scarlet*: but after a day it turned to a *darkish red*, and so continued many days; and in its primitive fluidity, it suffering not any alteration, but being as *fluid* as when it first issued from the *veins*: it stood in the window all the *frost*, not changing or freezing at all. No more did another *pottinger* of my blood that was mixed with the liquor of *Peter* which had *past the ashes*: but that last blood turned very *blackish*.

In fire, notwithstanding any thing I have done or purposed about the *nature of blood*, I do now desist from the *Enquiry*: the result of my thoughts being *this*, that there is a continual variation in the blood upon every disease, and often without it, during a *state of health*: that the blood of *Individuals* of the same kinde differs not only from it self, but in each other individual: that no man can by reason of this consideration know what he would *transfuse*; nor what it is he would *redifie*. In a word, that 'tis most prudent to insist upon *Experienced Methods* in *Physick*, and that all *phancies* about *spirit, salt, sulphur, fermentative fires* in the heart, occasioned by *heterogeneous mixtures*, and the expli-  
cations

plications of the operations of *Medicaments* by the new *Philosophers*, either *Chymical* or others, are all *vain*, and cannot be allowed as a *ground of practice*, till justified by *successful trials*; seeing that not only the *suppositions* are false, but whilst the *blood* is *sub diminio anima*, effects upon it are different from what when it is separate: and I think I may thence *conclude* rationally, that 'tis not conceivable that the *fabrick* of our bodies is purely *Mechanical*: for the *liquors* would have the same effect *on the blood in the body*, and *without*: which *they* have not.

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## A REVIEW of the precedent Discourse against Mr. GLANVILL

**A**FTER I had written the present *Discourse*, I was so unwilling to give any offence to the world, and so apprehensive lest my just indignation for the affront Mr. Glanvill had put upon my Faculty, should transport me beyond all fitting moderation, that I desired a Friend, (without further advising with me) to blot out whatever he might in prudence think equitable; by reason of his great cautiousness, as well as thorough that great haste and continual interruptions wherein the Treatise was penned; I finde several passages either omitted totally, or not sufficiently explained; so as that I could not acquiesce in the publication thereof, without some few additions, partly to prevent some cavills that might (though weakly) be raised against it, and partly to put every thing past dispute hereafter; that so I might not have any further occasion to write against our Virtuoso, nor his Abettors have any thing to do but to call in his Libell against the Physicians, and do some reasonable justice to those he had so arrogantly and injuriously insulted over. I desire my Reader to pardon me, if I have not in some circumstantial embellishments and regularity of procedure answered his expectation, since in the main I am sure I have out-done it.

Whereas I charge Mr. Glanvill (page 2.) with not having read the Authors which he mentions. These words, *Who can chuse but smile, when he reads how Apuleius improved the Mathematicks after Euclide?* the whole passage should have run thus; *Who can choose but smile when he reads how Apuleius improved Arithmetick?* All that Apuleius did was to translate something about Arithmetick into Latine, at such time as the Latines had no other Numerals then L. M. D. C. &c.

&c. And by reason of *this* performance of his doth Vossius give him a place amongst the *Authors*, not improvers of *Arithmetick*: and takes notice of him as the first that ever writ in *Latine* about that subject. Upon which account it was judiciously done of Vossius to mention him there; but Mr. Glanvill is grossly mistaken here to name him, where he treats of such as advanced useful knowledge; which a bare Translation doth not. It is true, Vossius saith of *Apuleius*,

Vossius de Sci-  
ent. Mathem.  
c. 51. sect. 1.

*Apuleius Arithmeticon Nicomachi Ge-  
aseni Pythagorici Latine transfudit teste  
Cassiodoro de mathem. Discipl. cap. de A-  
rithm. & Isidoro Hisp. Orig. iij. s. Jooss. de  
script. Hist. phil. l. 3. c. 13. p. 285.*

*Primus Arithmeticon Latinis literis  
illustravit*: which words import no  
more then I say; and 'tis manifest,  
that what He did was but a Translation  
of *Nicomachus*. So *Cassiodorus de*

*mathem. disciplinis. cap. de Arithmetica. Reliquae disciplina  
indigent Arithmetica disciplina, quam apud Gracos Nicomachos  
diligenter exposuit. Huic primum Madaurensis Apuleius,  
deinde magnificus vir Boethius Latino sermone translatum  
Romanis contulit lectitandum.* The same is asserted by *Isi-*

Vossius de sci-  
ent. mathem.  
c. 10. sect. 1.  
Blancanus Ma-  
them. Chro-  
nol. secul. 15.

*dorus Hispalensis.* This might our *Virtuoso* have observed in  
Vossius, when he read him: and what *Apuleius* performed is  
so meanly thought of by *Blancanus*, that in his *Chronicles* of  
*Mathematicians* he affords him no place, though he mention  
the *Arithmetical* work of *Boethius*. The imputation I fix  
upon Mr. Glanvill, for not understanding what the *Authors* he  
mentions had writ, and about his not having ever seen them,  
is manifest to any man that shall not only trace him by *Vos-*  
*sius*, but consider the ridiculous characters he fixeth upon  
the *Writers* alledged, viz. *Ptolemy* of *Alexandra* made con-  
siderable improvements in *Optics*: and *Alhazen* the *Ara-*  
*bian* is famous for what he did in it. From these *Vitellio* drew  
his, and advanced the Science by his own wit and their helps.

Vossius de sci-  
ent. Mathem.  
Mr. Glanvill  
p. 47. 4. &c.

\* *S. Stevinus* both invented and writ such  
in all parts of the pure and practical *Mathe-*  
*matics*, in *Geography*, *Geometry*, *Naviga-*  
*tion*, *Mechanicks*, &c. that never did any  
one, no, nor all the *Virtuosos* in *Engl.* and *Eu-*  
*rope*, ever equalled, or pursued: From  
hence 'tis apparent Mr. Glanvill, and his  
Abettors never read him: he was the first  
*Proposer* I know of, and before my Lord

\* *Stevinus* corrected *Euclid*, *Achazen*,  
and *Vitellio*, in some fundamental *Pro-*  
*positions* that were mistakes; and  
in the room substituted considerable  
inventions of his own. *Roger Bacon*  
writ acutely of *Opticks*. — Any man  
will grant, that he who gave so lame



an account of these Authors, never was acquainted with them, nor understood particularly what they writ, or added of their own invention: whether

Bacon, of a Society to carry on Experiments in order to the rectifying many errors, and improving many known truths: an Admirer of the Ancients, and their learning.

new theoremes, or different and new demonstrations of old known truths. Whereas he saith that Roger Bacon was accused of Magick to Pope Clement the fourth, and thereupon imprisoned: but the accusation was founded on nothing but his skill in Mathematicks, and the ignorance of his Accusers. — Assertions of this nature are not so easily passed by, so many learned and judicious persons having reckoned him in the number of Magicians; such are Joannes Wierus and other Demonographers. That the said Writer might declaim against Magick, or deny the possibility of it, and yet practise it, is an usual procedure with (a) that sort of people: and that his works have in them sundry Propositions that are superstitious and magical is granted by Delcio; such haply was that which Franciscus (b) Picus says he had read in his book of the sixth Science, where he affirms, that a man may become a Prophet, and foretel things to come by the means of the Glass Almucheti, composed according to the rules of perspective, provided he made use of it under a good constellation, and had before-hand made his body very even, and put it into a good temper by Chymistry.

Jes. Wierus de præst. dæm. l. 2. c. 2.

a Vide Bodin. in præf. ad dæmonomaniam.

b See Gabr. Naudæus his History of Magick. ch. 17.

As to what I say about Orontius, I adde the words of Sir H. Savile in his Lectures, p. 71. Josephus Scaliger — homo omnium mortalium, ne Orontio quidem excepto, ἀγεωμετρητότατος.

Whereas I say (p. 3.) that the ancient Physicians did not only cure cut-fingers, and invented Diapalma and other Medicaments in order thereunto. I adde (what I know not how was omitted) that it is notorious how all our Herbals and Druggists have explained the nature and use of Medicaments according to the Doctrine of the Elements, and qualities either arising therfrom, or from the peculiar mixture of the parts: and whosoever hath acted, or shall proceed according to those notions in compliance with the Ancients, shall not stand in need of

any novel Method from the *Virtuoso* to salve a cut-finger.

What I have said in the first and second sheet concerning the *Barometer* (as they call it) that it doth not determine exactly, neither the weight nor pressure of the aire, winde, or clouds, is an opinion which the more I think upon, the more I am confirmed in; nor do I doubt that others will be as scrupulous as I in their assent to our dogmatizing *Virtuoso*, when they shall seriously consider what follows, and accommodate it to the *Elasticity* and gravity of the *Atmosphæar*.

First, when our *Virtuoso* speaks of the *Elasticity* of the *Air*, he understands thereby a body whose constituent particles are of a peculiar configuration and texture, distinct from what can be ascribed to earth, water, or fire? "That the *Air* near the earth is such an heap of little bodies lying one upon another, as may be resembled to a fleece of wooll; for this (to compare it with other likenesses betwixt them) consists of many slender flexible hairs; each of which may indeed like a little Spring, be easily bent or rouled up; but will also, like a Spring, be still endeavouring to stretch it self out again. For, though both these Hairs, and the Aerial corpuscles to which we like them, do easily yield to external pressures; yet each of them (by vertue of its structure) is endowed with a power

Mr. Boyle in his first part of Experiments of the Aire: Exprim. 1.

I desire my Reader to take notice about the *Elasticity* of the *Air*, that the very names of *Elastic* and *Elasticity* are of a more ancient mention then the being of the *Society*: *Regius* and *Pecquetus* use the terms: and that as to the expansive motion of the *Air*, 'tis proposed by several *Cartesians*, and before them by *Kircher de maynet*. l. 2. part. 1. progymn. 3. See also *Mersenn*, and *Schortius* mechanic pneumat. hydraul: So that the *Society* can pretend to nothing but the similitude of a fleece of wooll, and the explicating it by that way.

Page 55.

"or principle of self-dilatation; by vertue whereof, though the Hairs may by a mans hand be bent and crowded closer together, and into a narrower room then suits best with the nature of the body: yet whilst the compression lasts, there is in the fleece they compose or endeavour outwards, whereby it continually thrusts against the hand that opposes its expansion. And upon the removal of the external pressure by opening the hand more or less, the compressed wooll does as it were spontaneously expand or display it self towards the recovery of its former loose and free condition, till the fleece have either regained its former dimensions, or at last, approved them as near as the compressing hand, (perchance not quite opened) will permit.



permit. — Against this I except not only that this *supposition* is far from a *sensible Philosophy*; but that whosoever would weigh the *Air* exactly, and estimate the accession of weight which the *Air* receives from winds, clouds, or vapors (the thing Mr. Glanvill promiseth us) must weigh the *Air* singly first, and in its utmost degree of expansion, otherwise he can never tell what its gravity is, or what accessional it receives by its *Elasticity*, by exhalations and different mixtures: But this is not done by the *Barometer* (however it be essayed in the experiment of *Aristotle* very judiciously) but only an imaginary column or *Cylinder* of *Air*, and its pressure upon the *Mercury* is considered: which procedure seems to me as ridiculous, as if a man should lay a fleece of wool, or any other body upon any thing, and there being above that an incumbent body of lead (or the like) bearing thereon, yet should he proceed to say that he weighed the fleece of wool and not the incumbent lead: for as yet no discoveries have acquainted the world with the nature of that *Aether* which is above the *Atmosphere*, whether it gravitate or press upon the subjacent *Air* (which a very subtle but rapid body may do) nor what effects the *Libration* of the *Moon* and other *Planets* may have by way of pressure upon the contiguous bodies, which pressure may be communicated to the *terrestrial Air*: and without the determination hereof, it is as vain to pretend to weigh the *Air* by this *Barometer*, as to determine of the weight of a board that presseth a *Cheese* in the *Vat*, without considering the *superincumbent* stone. Neither are we informed sufficiently what the *Figure* of the *Aether* is, whether it make a *convexe* and so encompass the *Atmosphere*; or also be interspersed with, and differently move therein; nor what effects those motions and agitations of it have upon the grosser corpuscles of the *Atmosphere*, (not only in abating of their gravity sometimes, but adding to them a *levitation*: nor is it explicated yet what effects the corpuscular rays of the fixed *Stars* and *Planets* may have in or upon the *Atmosphere*, adding to its gravity, (as 'tis just to imagine, since that eminent *Virtuoso*, the *Pliny* of our Age for lying, but a *Virtuoso*! could wash his hands in the beams of the *Moon*) or *Elasticity*,

Thus the *Moon* according to the *Cartesians* by its pressure upon the waters, causeth the *Tides* on *Earth*.

Sir R. D. of  
Simp. p. 43.  
Charlton de  
salm. ne.

of which those *intercurrent corpuscles* seem not void (though not *Airy*) which constitute *Thunder, Lightning, &c.* or diminishing them *both* in order to the *Phænomena*, which occur daily.

J. Voss de mo-  
tu mar. &  
vent. c. 21 p.  
94.

Secondly, it doth not yet appear by any thing alledged by our *Experimental Philosophers*, that for certain the Air which encompasseth the Earth is a distinct body of a different structure from the Earth and Water that compose the *Terraqueous Globe*. Isaac Vossius doth think the Air to be nothing else but *watrish exhalations* drawn up by the Sunne. — “Credimus Aerem esse Aquam seu humorem dilatatum, ad legem a-  
“*quilibrium quaquaversum se extendentem.* If it be so, it is a

*Aeris elementum juxta sacra eloquia nihil aliud est quam humidi: quædam perpetuo occupantis subtilissimæ & spirabilis substantia.* Kircher, *Iter ecclat.* 2 dial. 2. c. 3.

The Air seems nothing else but a kinde of tincture or solution of terrestrial and aqueous particles dissolved into the *Æther*, and agitated by it, just as the tincture of *Cochineal* is nothing but some finer dissoluble parts of that concrete lick'd up or dissolved by the fluid water. Mr. Hook *Microgr. obs.* 6. p. 13. *Atmosphæram ex halitibus terrestribus & vaporibus aqueis actione solis & reliquorum Astrorum concitari; inter doctos conuenit. Hanc eandem Atmosphæram, ob solis & reliquorum Astrorum conversiones variâ mutari & attenuari apud eisdem indubitatum est.* Scheiner *ros vagin* l. 4. p. 3. c. x.

vain supposition which attributes such a structure to the Air, as is repugnant to the water: Others there are which make the *Atmosphere* to be an aggregate of heterogeneous particles exhaled from this *Globe*, whose structure must be as discrepant as the vapours are: and what a difference there is in them we may guess by the infinite variety of *Meteors, Rains, Snows, Hail, Winds, Dews, &c.* and their component corpuscles. If this latter be true, (as 'tis probable that it is; at least that there is no more besides but an intercurrent *Æther* or *materia subtilis* of

the *Cartesians*) what becomes of this *Elasticity*, or *pressure* of this *Springy Air* so much talked of?

Thirdly, 'tis necessary to distinguish betwixt the *pressure* and *weight* of bodies: for, suppose were a man pressed under a bended stick, or other springy body compressed, he shall feel a great oppression upon him, and be kept down to his great pain, not with the weight but spring of the said stick, or other springy body: and whosoever by the violence of the compression would judge of the weight of the incumbent body, would expose himself to laughter.

Fourthly, 'tis possible for a body without any *springiness* or



or *accessional gravity*, to press downwards above its weight: thus a needle touched with a *Loadstone* declines from that line in which it hung parallel to the *Horizon*, without any addition of weight: which is demonstrable from the variety of its

*declination* and *restitution*: and 'tis as *indubitable* that such *declination* of it carries with it something of *pressure*.

Fifthly, we are to consider the nature of the *Earth*, whether that be a *Magnet*, or no: for if it be *such*, (however the *Magnetism* be explained, whether according to the *Cartesian Hypothesis*, or that of *Berigardus*) instead of *weighing the Air*, we deceive our selves as grossly as if we took the impulse with which *Iron* runs to the *Loadstone* for its weight: and thus in some cases we shall weigh things by *their ascent*, which is inconsistent with the common notion of *weighing things*.

Sixthly, to wave the *unestablished* notions of *Gravity* and *Lenity*, and to abstract from all the *preceding considerations*, I say, that even so this opinion of the *Aerial Column* pressing down upon the *Mercury* is false: since in a body so *unequally mixed* as the *Air* is often (and it cannot be disproved that 'tis ever otherwise) it is impossible to imagine that the *pressure* or *gravitation* is by way of a *Column* or *Cylinder*. Imagine the *Experiment* to be tried by *six* or more *weights* pressing at one time upon the *Mercury*, would any man in his wits say, that this *joint pressure* were *cylindrical*? consider but the variety of *mixtures* in the *Air*, (and the separate *pressures* that are *consequential* thereunto) which the contemplation of the *clouds* will lead us into, and 'tis the same thing. Were a man *swimming* in that *concourse* of *water* in *Hungary*, where the *unmixed rivers* flow in one *channel*, and his body so placed that part of it were in one *stream*, and part in another, would you say that the *incumbent water* did press upon him in a *Column* or *Cylinder*? But to proceed further, if it be true that the *superiour part* of the *Air* or *Atmosphere*, which transcends the *mountainous asperities* of the *Earth*, hath another *motion* or *lotion* then that which is more low,

(explain.

Acus somnino parallela horizonti, quæ subito atque magneti affricatur, nullo modo fit gravior, tamen deprimitur, perinde ac si magnes esset acui subiectus. Finge nunc aliquem, qui hæc a magnetis fieri nesciat, is profecto crederet cum Aristotele acum tendere ad centrum mundi. Berigard. de terra: circulo 6. part. 3.

Vide Galilei  
n. n. system.  
c. fin. dial. 4.  
128. 326. edit.  
in 4to.

(explain it either the *Aristotelian* way, or according to *Galileo*, and agreeably to the motion of the *Earth*) if this be true, (as I take it to be now) how can we determine of the *Gravity* of the neighbouring *Air* by this *Experiment*? and how vain is this notion of a *Cylinder*? for in a fluid agitated with different motions as the subject *Air* is by *repercussion* from the *Hills* and *Plains*, (which begets vibrations and undulations) God knows what it suffers upon the generation and motions of *Meteors*; and where the superior part hath a motion different oftentimes from the other, of whose rapidity we are as uncertain as of its structure, and texture, (and we see that the rapidity or swift motion of an heavy body takes it from its pressure and gravity) how can any man talk of *Aerial columns*, much less pretend to weigh the *Air incumbent*, and to determine exactly of any accession of weight, as *M. Glanvill* professeth to do? Besides, if heavy bodies do not gravitate in a straight line, but describe the circumference of a Circle, or some such line, (as new Philosophers hold in opposition to *Aristotle*) and if the *Atmosphere* be to

Vide Galileum de system. mundi dial. 2. pag. 119. edit. in 4to. Sedatoribus Copernici opus est dicere (quippe qui ponunt orbem magnum circulo ferri) motum gravi deorsum esse per lineam curvam vel instar quadratricis Nicomedis, vel circulari ut Galileus contendit. Scipio Claramont. de univers. l. xij. c. 20.

be reckon'd amongst the bodies that gravitate, how can we imagine this gravitation to be performed by way of a column or cylinder? Moreover, this *Atmosphere* can no way be considered to press cylindrically, if we consider that in every part of it there are continual exhalations, and smoke ascending through it, so that the weight of it must needs be abated by the ascent of those vapors: and what we experiment here is not the weight of the *Air* properly, but the super-ponderancy or over-weight of it. The *Atmosphere* seems to me constantly to resemble a *Glass* in which water is poured on wine, and the wine is ascending thorough each part of the water indeterminately; if it be thus, and that the ascending vapours carry a great force with them, (which any man

will grant who considers the weight of the smoke, in comparison to what remains of the wood and coal that is burnt: and who statically regards

Vide Sandorii medic. static. Hanc Aeris condensationem demonstrat vel ipsa saliva ex aëre demissa, quæ dilaceratur, prope terram in quam concentratus aer impingens ad salivam reddit, eamque dissepit. Berigard. circ. Pisar. part. 2. circ. 5. de terra.



regards the *steams* transpiring from our *bodies*: and how that *spittle*, which in an *entire body* issues from our mouths: descends till near the ground it be *dissipated and distended*) I cannot imagine how it can be said that we *thus measure all the degrees of compression in the Atmosphere, and estimate exactly any accession of weight which the Air receives from winds, clouds, or vapors.* To conclude, if the *Air* do thus press upon the *Mercury*, how comes it to pass that there is no difference when the *Experiment* is tried in a *chamber* (where the incumbent *column* is less then *abroad*) and in the open *Air* of the same *levell*? Why doth it not

press up *water* (or other *liquors*) in the like *Syphon* to an *height* as different as is the *disproportion* betwixt the *gravity*

Why doth not this *Cylinder* of *Air* which so presseth upon the *Mercury*, depress a leaf of *Gold*, but suffers it to rise up and down?

of *Mercury* and *water*: which I have not heard it doth; yet the proportion betwixt *Mercury* and *water* in *gravity* is 16.

134. In fine, how is that true which Mr. *Hooke* saith, viz.

“That he contrived an instrument to shew all the minute-vari-

Mr. Hooke in the Preface to his Micrography.

tions in the pressure of the *Air*: by which he constantly found,

“that before and during the time of rainy weather, the pressure

“of the *Air* is less, and in dry weather, but especially when an

“Eastern winde, (which having past over vast tracts of *Land*,

“is heavy with earthy particles) blows, it is much more:

“though these changes are varied according to very odd *Laws*.

If this be true, (as I am apt to believe it is) with what face

can our *Virtuoso* tell us, “It is concluded, that such a *Cylin-* Page 51.

“der of the *Air* as presses upon the *Mercury* in the vessel, is

“of equal weight to about 29 digits of that ponderous body in

“the *Tube*. Thus it is when the *Air* is in its ordinary temper:

“but vapours, winds and clouds alter the *Standard*, so that

“the *Quicksilver* sometimes falls, som-

“times rises in the *Glass*, proportion-

“ably to the greater or less accession of

“gravity and compression the *Air* hath

“received from any of those alterati-

“ons: and the degree of increase beyond

“the *Standard*, is the measure of the

“additional gravity. Is not this pret-

If you would see how true Mr. *Glanvill* speaks, read Mr. *Boyle* his eighteenth *Experiment*, and the defence of it against *Linus*: there you will find that the *Mercurial Cylinder* did in winter sometimes correspond with the *weather Glass* and sometimes vary: and the reason Mr. *Boyle* gives, is such as takes off from the certainty of Mr. *Glanvill*'s CONCLUSION.

tily

tily said by a man that writes a year after Mr. Hook, and more after Mr. Boyle? How unacquainted is He and his Assistants, even with the Writings of their fellow-Virtuosi? And if we may be allowed to transfer the Fool's Cap from the Ancients for concluding too soon, may we not crown the heads of our Virtuosi now therewith? And how careful the R.S. is in making good their promise to Olaus Borrichius, that what their Members should write, the whole Society would be responsible, let any man judge that considers how Mr. Hooke, and Mr. Glanvill (I beg Mr. Hook's pardon for the unequal comparison) disagree; and Dr. Henshaw (another Virtuoso) differs also from Mr. Glanvill, saying, That the Quicksilver Tube will not give so exact an account of every small difference in the pressing Air, as the THERMOMETER! what confusion shall we be reduced unto in time, should these contradictory Experimentators proceed as they have done! I shall here adde, that I do conceive that this notion of an Aerial column gravitating upon the Earth, or subjacent body, was framed in imitation of the Hypothesis of Simon Stevinus, the Teacher of Mathematicks to Grave Maurice of Nassau, in his fourth book of Hydrostaticks, where he insists much upon this Aqueous Column; but 'tis observable that that judicious person, the better to make out his Theoremes, presupposeth such things as give some repute to my objections about the Aerial Cylinder or Column, viz.

1. *Aquam omnibus partibus esse ponderitatis Homogenea.*
2. *Cujusvis aqua superficiem planam & horizonti parallelam esse.*
3. *Aqua fundo horizonti parallelo tantum insidet pondus, quantum est Aquea Columna cujus basis fundo, altitudo perpendiculari ab aquae superficie summa ad imam demissa sit equalis.*

Out of this last Proposition, and the demonstration and consequences thereof in him; 'tis manifest, that he supposed not one of his assertions would hold (though the Phenomena were the same in nature) as he worded and explained them, if



if that he did not free his *aqueous Column* from any *oblique pressures*, and make it *rectangular*. And as for his *Postulat-um*, that the *surface* of the water is *plain, flat and level*; he confesses it is not so really, viz. *Quatenus pars est sphaerica sive mundanae superficiei; mundanam autem superficiem dicimus sphaera cujusvis mundo concentrica*: he only professeth to assume it as true, because in *hydrostatics*, things happen as if it really were so; whereupon he scruples not to make use of a *supposition*, which is really, confessedly, and demonstrably false, as long as it conduceth to *practice*, and serves his turn as if it were true, without pursuing a more tedious, and not more useful Hypothesis agreeable to *Archimedes*. Which I take notice of by way of *Apology* for my self, and those who think fit to acquiesce in, or not to blame such *Methods* as are effectual, though otherwise vain and groundless. Another thing is, that He supposeth there that the *Earth* is the *Center of the world*. Out of all which I am more and more satisfied of the validity of my former doubts against this so much concluded upon *Aerial Column*, to the explanation whereof I finde no such cautions, or previous suppositions used, to take off the edge and force of such objections: neither indeed have I yet met with any thing of that subject proposed in a *Scientifical way*; and therefore much how it comes to be concluded upon so as Mr. *Glanvill* represents it to be.

Whereas I have said, that the *gravitation of the Air* (even *Elementary*) is an opinion of *Aristotles*, and that his Experiment was tried by *Claramontius*; I adde, that the *verity* of that trial (though indeed it extend only to the *impure Atmosphere*) is attested by *Ricciolus* in these words, "*Duo*  
*quarto Aquam, & Aerem nostrum habere aliquid levitatis*  
*gravitati admissum, ut villius adscendant, ut sint supra id*  
*quod est ipsis gravius; & vi hujus descendant. Hinc fit ut*  
*folles luserii, & Aere addensata bene inflati, etiam sine fari-*  
*pule ac vini infusione, plus ponderent, quam flaccidi: ut ex-*  
*quisita trutina deprehendes: immo ego expendi vesicam bo-*  
*vinam, quae flaccida erat scrupulorum 4. & granorum quatuor,*  
*esse inflatam scrup. 4. grav. 6. quare Aer. additus per infla-*  
*tionem, appendebat grana du.* Thus the incomparable

Y

Ricciolus,

S. Stev. nus  
 hydrostat. E-  
 lem. l. 4. Theo-  
 rem. 8.

Id. lib. postu-  
 lat. 6.

Id. lib. postu-  
 lat. 7.  
 Et projecto  
 tam receptum  
 fuerit hac ip-  
 sa non admi-  
 ttere, quam  
 postulantis  
 Astrologis ter-  
 ram esse mun-  
 di centrum si-  
 dem derogare

Ricciol. Al-  
 mag. l. 2.  
 c. 5. sect. 4.

Against  
Hobs c. 3.

Experiments  
of Air. Exper.  
6. and against  
Hobs c. 3.

Democrit. re-  
vivisc disp 1.  
c. 3. p. 14 in  
4to.

Circul. Pifca.  
part. 6. circ. 7.  
de nutritione.

Sancto-  
rius was a  
Galenist.

Ricciolus, whom I may as well reckon amongst the *Peripateticks*, as Mr. (a) Boyle doth *Schottus*: and how true that *Aristotelean Experiment* is Mr. Boyle demonstrates in his (b) *pneumatick discourses*. And though the works of *Galileo*, *Kepler*, *Mersennus*, *Gassendus*, *Pecquetus*, *Paschal*, were lost, and were as ignorant as some *Virtuosi* of their trials about the weight of the Air; yet would not the Assertion have seemed so strange and incredible as Mr. *Glanvill* represents it to be; for though *Maynenus* deny it, yet he brings in this Objection. "*Aer est gravis, &c. go. probatur prin-*"  
"a Mathematicis, qui de Aeris pondere scripserunt, invene-"  
"runtque ejus ponderis momenta. 2. A Francisco Mendoza,"  
"qui in suo viridario problema instituit, An in Aere navigari"  
"possit? 3. A descensu lapidum & aliorum gravium, qua"  
"Aeris pondere pragrammata urgent suum descensum, & velo-"  
"cius in fine quam in principio moventur. 4. Experimento ad-"  
"ducto a Bassone, qui follem inflatum citius descendere ait"  
"quam Aere vacuum, ob additum Aeris pondus. l. de motu in-"  
"tent. 1. art. 3. Berigardus also asserts the gravity of the"  
"Air, and justifies it by this Barometer, and the unequal as-"  
"cent of the Mercury on the top, and at the foot of a mountain." I shall summe up all, that may take off from the novelty of the thing, and deprive the R.S. of the glory of pretending to any interest in the discovery in the words of *Thomas Bartholinus* de pulmon. sect. 3. p. 60. "*Ingeniosus Sanctorius in in-*"  
"*veniendis instrumentis Medicis, inter alia Com. in 1 Fen. A-*"  
"*vic. Stateram ponit, qua ventorum vim & impetum ponde-*"  
"*rat. Inventis aliquid addam. Vitream phialam lanci nostre*"  
"*imponere, & leni balitu inflato videbis quam parum ponderi ac-*"  
"*creverit. In instrumento Magdeburgico testatur Otho Ge-*"  
"*riche Consul Magdeburgensis & inventor ejus, ponderari*"  
"*posse Aerem hoc pacto; quanto levius est vitrum post Aerem*"  
"*extractum, tantum ponderabat Aer antea in eo contentus. Varios*"  
"*modos alios Aeris levitatem bilance expendendi tradit Caspar*"  
"*Ens Thaummat. Mathemat. Probl. 93. c. 15. Vesicam bovinam*"  
"*se expendisse ait Joannes Bapt. Ricciolus Tom. 1. Almag.*"  
"*nov. l. 2. c. 5. num. 4. qua flaccida erat scrupulorum quatuor &*"  
"*granorum quatuor: & deprehendisse eandem inflatum scrupu-*"  
"*lorum.*"



"lorum 4. & granorum 6. Marcius Mercennus in Phenom.  
 "Propos. 29. asserit se Geometris presentibus & adjuvantibus  
 "ponderasse bilance *Æolipilam* aneam satis calefactam, &  
 "propemodum candentem, omnique humore destitutam & quam  
 "minimum Aeris continentem; deprehendisseque pondus fu-  
 "isse unciarum quatuor, drachmarum 6. & granorum 15.  
 "postquam vero naturaliter refrixisset *Æolipila*, & Aer an-  
 "tea rarefactus rediisset ad pristinum ac naturalem suum sta-  
 "tum, iterum ponderasse ipsam, & invenisse pondus precedente  
 "pondere majus fuisse quatuor gravis. Plura in hanc rem con-  
 "gessit. cl. Casp. Schottus in *Mechan.* p. I. protheor. 4.  
 "c. 6.

I have not Schottus by me at present; neither is there need of any further Inquiries; for I have sufficiently demonstrated that the Gravitation of the Air is an opinion of Aristotle, Averroes, and other Peripateticks, though not generally received by that sort of Philosophers: and that it was truly and experimentally demonstrated by them, especially as far as the Atmosphere is concerned in the Question. I have also made it apparent, that the Barometer, or Mercurial Experiment doth not discover the weight of the Air with any certainty; much less, all the degrees of it: That the pressure of the Air is not by way of a Cylinder or Column; and that the Barometer had not its original but denomination from the R.S. they were, as I may term them, the God-fathers, not Parents. The World may justly say of the Honourable Mr. Boyle, that he hath improved the Experiments of his Predecessors, and represented them more accurately; and of Mr. Glanville and his Assistant what it pleaseth.

In the marginal note (page 15.) where I say, that perhaps it is not true that Aristotle had any hand in, or was privy to the impoisoning of Alexander; I adde that Pausanias after he had spoke of the Stygian water, and its strange property, doubts whether Alexander were made away by such means, or no: Σαφῶς μὲν ἐκ τῆς ἀλγύου, ὅτι οὐδὲν. This he says (in Arcadic) without reflecting any way upon Aristotle as one concerned in the report. And Arrianus who writ the life of Alexander, out of the Memoires of Ptolomeus Lagides

(who was present when that great *Prince* died) avows, that he died of a surfeit: yet he relates sundry rumors about his death, one whereof is, that *Aristotle* (being fearful of *Alexander* after the death of *Calisthenes*) should prepare the poison for *Antipater*, to be sent him: but concludes thus, καὶ ταῦτα ἔμοι, ὡς μὴ ἀγνοεῖν δοξαίμι μάλλον ὅτι λεγόμενά εἰσι, ἢ ὡς πιστὰ εἰσαφῆσιν ἀναλεσθαι. *Arrian. de expedit. Alexandr. l. 7.*

Whereas I reflect (page 16.) upon that passage of *Plato*, "Ο Θεός γεωμετρεῖ, and what *Mr. Glanvill* saith, "That  
 "without Geometry we cannot in any good degree understand  
 "the Artifice of the Omniscient Architect in the compofure of  
 "the great World and our selves: and that the Universe must  
 "be known by the Art whereby it was made. — There  
 should have been a Chasme made for some passages, I know  
 not why omitted. I adde therefore, that it is not revealed  
 unto us that God made the Universe according to that Art,  
 and it seems an Additional to the first *Fiat*, or let there be —  
 in *Genesis*, to say his commands were regulated by the rules  
 of Geometry, and his powerful and omnipotent word confined  
 thereunto. Had *Mr. Glanvill* been pleased to consult the  
 fathers, he would have found that this Tenet of his is no  
 primitive notion: and that particularly *Eusebius* hath re-  
 futed it, denying that God in his Works is obliged to Geo-  
 metrical numbers; and that *Socrates* (whose authority is  
 greater then *Plato's*) did place no great value on those Scien-  
 ces: that the first Christians did slight the knowledge of them  
 as useless to Piety and knowledge of God; because my opi-  
 nion about these things is agreeable to that of the first  
 Christians, and of *Socrates*; I shall insert the whole passage,  
 as it is translated into *Latine* in the *Paris Edition*.

*Euseb. prap. Evangelica l. 14. c. 10, 11. edit. Paris. 1628.*

Primum tamen quoniam Mathematica illa sua tantopere  
 jactare solent, prorsusque necessarium esse dicunt, ut  
 quisquis comprehendendi veri studio tenebitur, *Astronomiam*,  
*Arithmetriam*, *Geometriam*, *Muscam*, illa nimirum ipsa,  
 quæ ad eos a Barbaris profecta esse jam ostendimus, perse-  
 quatur:

*Mr. Glanvill*  
 p 25.

*Euseb. de*  
*prap. Evang*  
*l. 14 c 4.*



quatur: (his enim qui carebit, *doctum perfectumque Philosophum* esse neminem, imo rerum veritatem ne primoribus quidem labris digustare posse, nisi qui *harum* ante rerum animo cognitionem imprefferit :) deinde hanc suarum artium peritiam magnificentius ostentantes, æthere sese medio *sublimius* propemodum incidere, *numerisque suis* ipsum quoque *Deum* circumferre arbitrantur: nos vero qui *similium disciplinarum amore non flagremus*, nihil a *pecudibus* abesse existimant, *deique* propterea nunquam nunquam *rei paulo gravioris notitiam percepturos* esse pronunciant: Age, hoc ipsum quam pravum sit atque distortum, vera laminis loco ratione proposita, sic tanquam ad libellam & regulam exigamus. Erit ea quidem ejusmodi, quæ Græcos, innumera- biles, infinitosque Barbaros complexa; alios tametsi *his artibus doctrinisque paratos*, nec *Deum* unquam, nec *bonesta vite rationes*, nec omnino præclarum & utile quid percepisse; alios, ut ab omnium disciplinarum studio destituti essent, *religiosissimos* tamen ac *sapientissimos* extitisse demon- stret. Enimvero quænam hoc in genere *Socratis* illius, qui ab istis omnibus tantopere celebratur, sententia fuerit, e *Xenophonte* intelliges, si modo ei *suis in Memorabilibus* hæc scribente fidem adhibebis.

“Docebat, *inquit ille*, præterea, quatenus cujusque rei  
 “peritum esse hominem *bene institute* oporteret: principio  
 • “*Geometrica* dandam eatenus operam esse dicebat, ut si  
 “quando res pasceret, dimensam rite terram vel accipere ab  
 “alio, vel alii tradere, vel eam dividere, vel opus aliquod de-  
 “signare posset. Id porro tam esse ad discendum facile, ut  
 “qui dimensionem attendere voluerit, idem simul & quanta  
 “sit terræ magnitudo assequi possit, & quænam ejus metien-  
 “dæ ratio breviter admodum expediteque cognoscere. At  
 “ejusdem in *Geometrica* studio, ad illas usque descriptiones  
 “intellectu difficiliiores quenquam progredi, *Socrati* non  
 “placebat. Cui enim *bono futuræ illæ* essent, videre se, ta-  
 “metsi ne illarum quidem imperitus esset, rogabat. Enim-  
 “vero, ad exhaustiendam hominis vitam cum satis illas esse,  
 “tum aliarum interim & plurimum & *utiliorum doctrina-  
 rum* studia impedire. *Astronomiam* similiter eatenus com-  
 plecti

"placiti so'um jubebat, ut *noctis, mensis, annique tempora*  
 "cognosceres, atque hujus cognitionis ope, siquando vel  
 "iter, vel navigatio suscipienda esset, vel agenda forent ex-  
 "cubæ, vel in aliud quidlibet quod noctis, mensis, annique  
 "spatio fieri solet, incumbendum, signis ad ea omnia suis  
 "quæque temporibus obeunda, certioribus uterere. Atqui  
 "hæc nihilo difficilius tam ex nocturnis venatoribus, quam  
 "ex navium gubernatoribus, & aliis quamplurimis resciri  
 "posse, a quibus eorum peritiam suæ cujusque partes offi-  
 "ciumque deposcat. At *eandem artem* eo usque persequi,  
 "dum ea quæ non eodem motu circumferantur, stellasque  
 "simul errantes & vagas distinguere noveris, adeoque in ea-  
 "rum abs terra intervallis, conversionibus causisque riman-  
 "dis ætatem viresque consumere, id vero graviter imprimis  
 "ac serio prohibebat, quod *multum hujus etiam opere preti-*  
 "*um* videret, tametsi ne in istis quidem rebus hospes ipse  
 "ac peregrinus esset. Addebat, conficiendæ hominis vitæ  
 "illas quæque satis futuras, quæ interim a pluribus *utiliori-*  
 "*busque studiis* avocarent. Postremo quibus *cœlestia* quæ-  
 "que rationibus *Numen* moderetur, investigari volebat,  
 "quod cum eo ab hominibus aspirari non posse, tum minus  
 "cum diis probari existimaret, qui quæ prompta notaque  
 "esse nolissent, inquireret. Nec minus illi, quem ea ve-  
 "hementius cura destineret, *insania periculum* imminere di-  
 "cebat, quam *Anaxagora*, qui explicatus a se *deorum Ma-*  
 "*chinas* tantopere gloriabatur.

I shall adde, that if *God Almighty* be regulated by the  
 rules of *Geometry*, and *mechanical motion* in the manage-  
 ment of this *world*, and that the *fabrick* of things is *necessa-*  
*rily* established upon *those Hypotheses*, I cannot any way com-  
 prehend how *God* can do any *miracles*: how the *Sun* should  
*stand still* at the command of *Josuah*, or the *shadow* go back  
 on the dial of *Ahaz*: or how there could be a *general de-*  
*luge*; or such an *Eclipse* as is related at the death of our  
*Saviour*: or that the fire should not *burn*, or destroy the  
*three children*: in *which*, and *other cases*, if *God* were not  
 tied up to this *Art*, I do want proof (till he declare it) that  
 at *other times* he acts *altogether agreeably* to it. This opi-  
 nion



nion of mine hath been hitherto the most Christian Assertion, and held most consonant to Piety, and hath been amply maintained of late by Dr. Henry More, in opposition to what the Royal Society lays down in their History; "That Gene-

"ration, Corruption, Alteration, and  
 "all the vicissitudes of Nature, are nothing  
 "else but the effects arising from the meet-  
 "ing of little bodies, of differing figures,  
 "magnitudes and velocities. Then which  
 opinion there can be nothing more pesti-  
 lent and pernicious; and Dr. More,  
 albeit a Member of this Society hereto-  
 fore, (for he allows nothing to it  
 now) yet a pious one, professeth that  
 this Mechanical Philosophy doth in-  
 cline to Atheism: neither would he ap-  
 prove of those deductions as necessary,  
 but ridiculous, when I upbraided him  
 lately with that non-sensical and illiterate  
 History, Mr. Sprat p 348. "'Tis true,  
 "his, [viz. The Experimental Philo-  
 "sophers] employment is about materi-  
 "al things. But this is so far from  
 "drawing him to oppose invisible Beings,  
 "that it rather puts his thoughts into an  
 "excellent good capacity to believe them.

"In every work of Nature that he handles, he knows that  
 "there is not only a gross substance, which presents it self  
 "to all mens Eyes; but an infinite subtilty of parts, which  
 "come not into the sharpest sense. So that what the Scri-  
 "pture relates of the purity of God, of the spirituality of  
 "his Nature, and that of Angels, and the souls of men,  
 "cannot seem incredible to him, when he perceives the  
 "numberless particles that move in every mans Blood, and  
 "the prodigious streams that continually flow unseen from every  
 "body: having found that his own senses have been so far as-  
 "sisted by the Instruments of Art, he may sooner admit that  
 "his minde ought to be raised higher by an Heavenly light,

Mr. Sprat pag. 311

I wonder that such effects should be attributed by them to the bare concurrence and meeting of corpuscles of differing figures, magnitudes and velocities; without taking notice of that alteration of texture, and of the figures of the concurrent particles, without which Cartesianism, nor the other Mechanical Philosophies can subsist; and not so without allowing the constant assistance of God, directing and ordering lay-Mechanism. So des Cartes Princ. Philos part. 1. Deus materiam simul cum motu & quiete in principis creavit; jamque per Solem suum concursum ordinarium tantandem motus & quietis in ea tota, quantum tunc posuit conservet. Oh! rare and sensible explication of things! God Almighty in a peculiar manner agitates matter! must we thus explain the secondary and mediate creation of the world in six days, whereas the like productions have not hap- pened in so many thousand years as are hap- ped since! Besides, whatever our Virtu- so thinks of the Eternal Generation and Incarnation of the Son of God; He doth not except in this Assertion the Genera- tion of mankind in the ordinary and natural way.

“in those things wherein his *senses* do fall short. If (as the Apostle says) the invisible things of God are manifested by the visible: then how much stronger Arguments has he for his belief, in the *eternal Power* and *Godhead*, from the vast number of creatures that are invisible to others, but are exposed to his view by the help of his Experiments? My censure upon this place is, that if his Experimentator have any skill in *Logick* or the ways of arguing, though from the *Rules of Mechanism*, and the contemplation of visible bodies, he may proceed to the allowance of invisible and insensible corpuscles, yet shall he still confine his progress and ascent within the nature of matter and corpuscles, and never apprehend (upon those grounds) the being and operations of an immaterial, omnipresent Deity acting by the Word of his Power and Will: nor the incorporeal nature of the soul of man. Such a Transition *ad genus a genere*, or μεταβασις εἰς ἄλλο γένος, he that owns those principles cannot assent unto, if he understands himself, and argue not so as to alledge,

One Proposition for sense,  
The other for convenience.

Ricciolus in  
Chronie part.  
2. prefixo ad  
Almag. II. nov.  
in Archytas.

Where I speak of *Archytas* (pag. 18.) that he was a practical and Mechanical Philosopher, contrary to what Mr. Glanvill asserts (pag. 27.) I shall adde his life; As it is briefly written in Ricciolus thus. “*Archytas Tarentinus Pythagoreus nobilis, Mathematicarum peritissimus, quem ut una cum Timæo cognosceret Plato, in Italiam navigavit, ut ait Cicero. In Mechanicis excelluit, & vi illarum quin- quies vicit hostes in prælio, ut nihil dicam de columba lignea, quam libramenis ad violatum compulit; sed in Cosmographia at Geometria practica excelluisse indicat illud Horatii lib. I. odorum.*”

*Te maris ac terra numeroque carentis arena,  
Mensorem cohibent Archyta.*

Neither



Neither is Mr. Glanvill mistaken there in reference to Archytas only: what he saith about Eudoxus Cnidius is false: who was a Mechanician also, and amongst other discoveries, "*Invenit etiam Arachnen, horologium videlicet solum, in quo linea horaria, & arcus signorum in modum aranea se secant.*" Blancan. in Chronol. Mathemat. Sevil. 5.

Whereas I say (page 22.) that the Royal Society were not the first that applied themselves to the observing the formes of Animals, &c. by the Microscope: I adde that Zucchius did not only precede them in the attempt, but seems to have had better glasses to that purpose then they: for whereas Mr. Hooke in his description of a Flea says of the Eyes only this, that the head is on either side beautified with a quick and round black eye: the more accurate Zucchius saith, "*Novissime Microscopio parato ab excellentissimo Virorum in omnes formas ad propositos usus formatore D. Eustachio Divinio Septempedano, spectavi meis oculis senescentibus Oculum pulicis, distinctis in eo albescente Sclerotide a Cornea, & per corneam Iride oculi.*" And in the description of the feet of a Fly, and the feather of a Peacock, observe that there is such a difference betwixt those two Writers, that as one of them must needs be in an error, so I am apt to think that our Virtuoso is the person: see Mr. Hooke p. 167, 168, 169, 170. and Zucchius Philos. opt. part. 2. tr. 3. c. 7. sect. 4. pag. 349, 350. If England do yield better Microscopes then those of Eustachius Divinius, then I am ready to change my judgement.

Where Mr. Glanvill speaks of going to the World of the Moon, and I animadvert upon the difficulties of the journey, and that his lodging will be too hot for him; adde in the Text these words page 43.

Besides the other difficulties of the journey, 'tis further considerable, that from the Centre of the Earth to the Moon, according to the calculation of Tycho Brahe, there is near 56 semidiameters of the Earth, which is about 192416 miles: and admit it be supposed that Mr. Glanvill flie 20 miles every day in ascending towards that world, he should be above 15 years before he could come to the Orbe of the Moon.

Z

Where

Blancanus  
saith of Archytas, that  
he was Mechanica  
inventor, in  
Chronol. mathemat.  
secul. 5.

And Will.  
Snellius in his  
Preface to the  
Hypomn. mathematic.  
of S.  
Stevinus, doth  
reackon upon  
Archytas and  
Eudoxus as eminent  
for  
practical Mechanicks.

Mr. Hooke  
micrograph.  
p. 210.  
Zucchius  
philos. opt.  
part. 2. cap. 2.  
sect. 2. p. 39.

Van. Etten  
Mathem. recreations  
pag. 220, 221.

Where I speak against the accommodating of Scripture to common railing, p. 49. I adde, that not only the Council of Trent (*— fas est & ab hoste doceri*) hath prohibited Sess. 4. that any should apply the holy Scripture *ad scurritia, fabulosa, vana, adulationes*; but also that the first Council at Millain, forbids the using it *ad iocum, ostentationem, contumeliam, superstitionem, impietatem*. And, to upbraid our Divine-Railleurs a little more, an ancient African Council decrees, *Si Clericus, aut Monachus verba scurritia, jocularia risumque moventia loquitur, acerrime corripatur*. The words of which Canon, (*viz. Scurritia & jocularia*) are by a learned Frenchman rendred raillery. — “*Nous avons le Canon d’ un ancien Concile d’ Afrique, qui parle en ces termes: Si quelqu’ un du Clerge ou d’ un Religieux dit des paroles de raillerie, des choses plaisantes & enjouées, qu’ il soit chastie tres severement. Qu’ eussent dit a vostre avis ces bons Peres si ces railleries eussent este terees de l’ Escriture?*” This Question hath been agitated with much wit and address in French, betwixt Mr. de Girac and Mr. Costar in sundry books, wherein any man of common reason and piety, will give the advantage to adversary of Voiture, who is justified by the concurrent opinion of Balzac in his remarks *sur les deux sonnets*: and to these Writers I refer our Virtuosi, such as reckon upon all other learning as Pedantry, may inform themselves thence as out of Writers which transcend not their breeding and studies.

Whereas (pag. 58.) I speak somewhat in commendation of the ancient Aristotelean Monks, I finde that their esteem is much advanced by the learned Gabriel Naudæus in these words. “*After the last taking of Constantinople, Learning began to creep out of Monasteries, which for all the time before had been (as it were) publike Christian Schools, where not only youth, but also such men as would apply themselves that way, were instructed in all manner of Disciplines, Sciences, and Morality, and that to such an height, that not content with that so famous Quadrivium of the Mathematicks, which, besides all that is now shewn in Colledges, was then taught, Medicine both as to Theory and Practice, was so well cultivated, that we need no more to convince us how expert they were therein, then the Writings of Ægidius, Constantine,*

and



"and Damascens, Joannitius, Peter of Spain, and Turis-  
 "nus. So that it were ease for me to answer them who charge  
 them with illiterature and ignorance.

Where I speak out of G. Hofman and others, that it is suf-  
 ficient for a *Physician* that he proceed upon such rules and  
 methods as may most commodiously guide him in his practice,  
 without being solicitous whether they be rigorously and phi-  
 losophically true: pag. 75. I adde, that there are others as  
 eminent as any that ever pretended to cure, which concur  
 with me in this opinion. As *Avicenna* and *Riolanus*; the  
 words of the latter in his *Examen of Harvey*, c. 19. are these.

" — Quapropter cum *Avicenna* doctr. 6. cap. distinguo sermo-  
 "nem utilem a vero; *Medicus* qua *Medicus*, inquit ille, non  
 "curat, quid in veritate sit, sed contentus est *Phaenomenis* qui-  
 "busdam, quae sunt satis illi in curatione morborum.

I adde unto the passages (pag. 97.) which relate unto the  
 diligence of the *Ancients* in *Dissections*, this: That the *Anci-  
 ents*, and particularly the *Peripateticks* were very curious and  
 inquisitive into *Anatomy* appears by this passage out of *Ghal-  
 cidius*, in his discourse upon the *Timaus* of *Plato*; he lived  
 about one thousand one hundred and seventy years ago, and the  
 passage (which relates to the *Platonick* notion about vision)  
 in the *Latin* Edition of *Meursius*, (pag. 340) runs thus. *Qua-  
 re faciendum ut ad certam explorationem Platonici dogmatis  
 commentum vetus advocetur medicorum, & item Physico-  
 rum, illustrium sane virorum, qui, ad comprehendendam sana  
 natura solertiam, actus humani corporis, facta membrorum  
 exsectione, rimati sunt: qui existimabant, ita demum se sus-  
 picionibus, atque opinionibus certiores futuros, si tam rationi vi-  
 sus, quam visui ratio concineret. Demonstranda igitur oculi na-  
 tura est: de qua cum plerique alii, tum Alcmaeus Crotoni-  
 ensis, in Physicis exercitatus, quique primus exsectionem ag-  
 gredi est ausus; & Callisthenes, Aristotelis auditor; & Hero-  
 philus, multa, & praeclara in lucem protulerunt.* Out of which  
 it is manifest that the *Ancients* (especially the *Aristotelians*;  
 for such were *Callisthenes* and *Herophilus*) did with some curio-  
 sity examine the *Phaenomena* of nature, and regulated their o-  
 pinions by sensible experiments; and that this was the practice  
 of most of the eminent *Physicians* and *Naturalists* of old.

The Letter of *Hippocrates* to *Damagetas* mentioned pag. 89. (though cited as genuine by *Galen*) is suspected by *Jo. Baptista Cartes*. miscell. medic. dec. i. c. 4. "*Caterum & hac Epistola, qua sub nomine Hippocratis circumfertur, suspecta est mihi, primum quia Diogenes Laertius lib. 9. in vita Democriti scribit illum nequaquam ridentem, quanquam concedat ab Hippocrate fuisse visitatum (non quidem ut ipsum sanaret) quo tempore jam Democritus erat decrepitu, nec amplius aptus sectioni cadaveram; nam Hippocrates 436 annos ante Christum natus; Democritus vero 492 ita ut ita ut Democritum nativitate secutus sit Hippocrates 56 annis: & tum sive ad videndum, sive ad sanandum eum conveniret, vigesimum quintum annum attigisse verisimile videtur: cum tunc temporis Hippocrates medici famam adeptus esset, quod non poterat nisi per longum temporis cursum & varia experimenta in Medicina facta sibi comparare. — Sed probandam proventiorem Hippocratis aetatem, & majorem senectam Democriti, ejusdem Laertii testimonium extat dicentis; Ultimum, quod in vita Democriti legitur dictum, aut factum, fuisse illam cum Hippocrate colloquutionem: atque annu agentem 109. ab hujus vita Statione decessisse. I* finde also that *Menagius* suspects those Letters, though he confesses them to be very ancient. Extant hodie Hippocratis de sua ad Democritum profectione Epistolæ, sed supposititiæ, licet perantiquæ.

*Menag. in Diog. Laert. l. 9. p. 238.*

Whereas I say pag. 114. that I have observed in some that their pulses have suffered no alteration, at least kept no time, or palpitated as did their hearts. I shall illustrate this with an observation in a young Lady, which I had too fatal an opportunity lately to make: she died of a very malignant Feaver joyned with the Measles: two nights before she died I watched with her, and frequently observing the variety of her pulse, I determined to minde whether there were any such alteration in the beating of the Heart, as I then observed in her Arteries: I laid my hand upon her Breast, and I found that her heart did not beat as usually it doth, the bone erecting it self, and impelling the left side, but it seemed like a great bullet (transcending any proportion that is natural;



tural to the *Heart*) as it rolled in the *Thorax* from the right to the left side (as much one way as the other) with an uniform and equable revolution, and thus it continued to do for an houre; during which time I observed all the varieties almost that are recorded about evil pulses: as quick, slow; great, small; unequal, deficient, dicrotus, &c. Nor is this new; for *Riolanus* saith in *Exam. Harvey* c. 3. *Notavi multoties in palpitationibus cordis vehementibus arterias non sequi motum Cordis, sed bis terve pulsare Cor pro una diastole Arteriarum: quod indicat Arterias in sanis & agris corporibus, non semper sequi motus cordis.* So doth *Mercatus* teach, *Fit interdum palpitation cordis nihil mutatis pulsibus.* Tom. 2. de *Philos. differ.* l. 2. tr. 1. c. 28. & tom. 3. l. 2. c. xj.

Since the writing hereof, being casually in the shop where an old man was blooded, who upon the healing up of an old sore in his leg, was very ill: I observed his blood to have very little of what was crimson in it: but it seemed all a fluid Serum to the bottom, (which was pellucid, not of a turbid white,) in some Pottingers: in one Pottinger that ran last, it was coagulated into a thicker mass, on the top whereof was coagulated a translucent gelatine over most of the Pottinger, the rest being of a fluid Serum like to the other: I took some spirit of Vitriol, and poured a pretty quantity, (viz. about 20 drops) on that which was partly coagulated upwards, partly not: and all that part which was not blood, did coagulate into a mass like unto the white of an Egge when hardened by the fire, but without that smell which is usual to it when coagulated upon a gentle fire: the blood under it coagulated into a consistence much like wax: but of a dark red inclining to black: into another Pottinger I poured some of the salt-peter-liquor that had passed the Ashes; but this latter caused no change at all: I then poured on the same some spirit of Vitriol, as in the other, and it did immediately turn lacteous, and coagulated into a mass like to that of ordinary custards: and the blood under, which seemed but very little, and scarce coagulated, appeared thereupon as a large quantity, equalling three parts of the Pottinger, upon which all the Serum was thus coagulated. I went to burn these: that.

that blood which had only *Spirit of Vitriol* did not crackle, and scarce burn: though a little it did: the pure coagulated *Serum* did not burn at all, yet crackled like decrepitating Salt, a little: that with the *Spirit of Vitriol* and *Lixivium of Nitre*, did burn with a *vivid and lasting flame* a long time.

I think my self obliged to adde one thing more where I speak as if *Dr. Willis* had had little to do in the discoveries of *Dr. Lower* about *Anatomy*: that although that great *Physician* had not leisure to attend the *Anatomical Inquiries*, yet did he propose new matter for improving the discoveries, and put *Dr. Lower* upon continual investigation, thereby to see if *Nature* and his *Suppositions* did accord: and although that many things did occur beyond his apprehension, yet was the grand occasion of that work, and in much the Author. This *Intelligence* doth not cross what I related before from good testimony; yet I thought my self obliged to declare the whole truth, and such I believe this to be. I must also profess that I think the *Sinus venarum vertebrales*, whose invention I ascribe to *Dr. Lower*, may without considerable injury be ascribed unto *Fallopian* in his *Anatomical Observations* pag. 193. edit. *Coloniens.* 1562. in 8°. Thus much I thought fitting to annex, lest the *Virtuosi* should censure me as partial to my old School-fellow *Dr. Lower*, or swayed by any regard then that of Truth.

The Hogs-blood which I last mentioned as poured upon the *Mothers of Salt-peter*; after it had stood above three weeks unmixed, did at last cast down about half of it self below the *Mothers*, it continuing in that place it turned crimson: that on the top did not change its colour, but on the surface there gathered a crust or mass, not very thick (as before) nor of so solid a consistence.

F I N I S.



To divert my *Reader* after so tedious a discourse, I shall here adde the Letter of *Coga* their *Patient*, that they may see how efficacious the Transfusion hath been on *him*, and what returnes he makes for his *Cure*.

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To the Royal Society the *VIRTUOSI*, and all the  
Honourable Members of it, the Humble Address of  
AGNUS COGA.

**Y**Our Creature (for he was his own man till your Experiment transform'd him into another *species*) amongst those many alterations he finds in his condition, which he thinks himself oblig'd to represent them, finds a decay in his purse as well as his body, and to recruit his spirits is forc't to forfeit his nerves, for so is money as well in peace as warre. 'Tis very miserable, that the want of natural heat should rob him of his artificial too: But such is his case; to repair his own ruines, (yours, because made by you) he pawns his cloaths, and dearly purchases your sheeps blood with the loss of his own wooll. In this sheep-wrack't vessel of his, like that of *Argos*, he addressees himself to you for the Golden Fleece. For he thinks it requisite to your Honours, as perfect Metaplasts, to transform him without as well as within. If you oblige him in this, he hath more blood still at your service, provided it may be his own, that it may be the nobler sacrifice.

*The meanest of your Flock,*  
AGNUS COGA.

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